OPTICS & PHOTONICS International Congress

OPIC 2024

22-26 April 2024

Congress Program

Plenary Session

Joint Session

Specialized International Conferences

- ALPS 2024 : The 13th Advanced Lasers and Photon Sources
- BFSS 2024 : Business and Finance in Sustainable Society 2024 –towards the expansion of photonics industry–
- BISC 2024 : The 10th Biomedical Imaging and Sensing Conference
- HEDS 2024 : International Conference on High Energy Density Science 2024
- ICNN 2024 : International Conference on Nano-photonics and Nano-optoelectronics 2024
- IP 2024 : Information Photonics 2024
- LDC 2024 : Laser Display and Lighting Conference 2024
- LEDIA 2024 : The 10th International Conference on Light-Emitting Devices and Their Industrial Applications
- LSC 2024 : Conference on Laser and Synchrotron Radiation Combination Experiment 2024
- LSSE 2024 : Laser Solutions for Space and the Earth 2024
- OMC 2024 : The 11th Optical Manipulation and Structured Materials Conference
- OPTM 2024 : Optical Technology and Measurement for Industrial Applications 2024
- OWPT 2024 : The 6th Optical Wireless and Fiber Power Transmission Conference
- SLPC 2024 : The 5th Smart Laser Processing Conference
- TILA-LIC 2024 : Tiny Integrated Laser and Laser Ignition Conference 2024
- XOPT 2024 : International Conference on X-ray Optics and Applications 2024

2024 | PLAN TO ATTEND

SPIE. OPTICS+ PHOTONICS

18–22 August 2024
San Diego Convention Center
San Diego, California USA

THE LEADING MULTIDISCIPLINARY OPTICAL SCIENCES AND TECHNOLOGY MEETING

Make plans to attend this annual event and join leading researchers and scientists as they contribute to advancements in optical engineering, nanotechnology, and organic photonics. This year enjoy a special focus on sustainability and AI/ML.

Meet face-to-face with premier researchers and discuss your product needs with top optics and photonics suppliers at the free 3-day exhibition. Industry partners will be there to help solve problems, cut costs, and increase capabilities.

Registration is open. We look forward to seeing you in San Diego.

www.spie.org/op

Table of Contents

OPTICS & PHOTONICS International Congress 2024

Date: Monday 22 - Friday 26 April 2024

Organized by OPTICS & PHOTONICS International Council

Specialized International Conference Organized by

The Laser Society of Japan
The Optical Society of Japan
Japan Laser Processing Society
SPIE–The International Society for Optics and Photonics (USA)
Institute for Nano Quantum Electronics, The University of Tokyo
Institute of Laser Engineering, Osaka University
The Graduate School for the Creation of New Photonics Industries
Micro Solid-State Photonics Association
The executive committee of Laser Solution for Space and the Earth
Technical Committee for Ultraprecision Machining of The Japan Society for Precision Engineering
RIKEN SPring-8 Center
Research Center for Precision Engineering, Osaka University
Technical Committee for Mechano-photonics, The Japan Society for Precision Engineering
Study Group of Optical Wireless Power Transmission

Supported by

Ministry of Agriculture, Forestry and Fisheries
Ministry of Economy, Trade and Industry
Ministry of Education, Culture, Sports, Science and Technology
Ministry of Health, Labor and Welfare
Ministry of Land, Infrastructure, Transport and Tourism
Japan Tourism Agency, Ministry of Land, Infrastructure, Transport and Tourism
JST–Japan Science and Technology Agency
Keidanren
NEDO–New Energy and Industrial Technology Development Organization

In cooperation with

AIST–National Institute of Advanced Industrial Science and Technology
AESJ–Atomic Energy Society of Japan
QST–National Institutes for Quantum and Radiological Science and Technology
RIKEN
JSPF–The Japan Society of Plasma Science and Nuclear Fusion Research
OITDA–Optoelectronics Industry and Technology Development Association
OSJ–The Optical Society of Japan
JPC–Japan Photonics Counil
Institute for Laser Technology
Fraunhofer Institute for Laser Technology ILT (Germany)
OPTICA (USA)
PIDA–Photonics Industry & Technology Development Association (Taiwan)
Photonics Media (USA)
SPIE–The International Society for Optics and Photonics (USA)
The Optronics Co., Ltd.

Welcome to OPIC 2024

Fumihiko Kannari
Chair
OPIC 2024 Organizing Committee
Professor Emeritus, Keio University

Osamu Matoba
Chair
OPIC 2024 Steering Committee
Professor, Kobe University

The Optics and Photonics International Council (OPI Council) has held the Optics and Photonics International Conference (OPIC) and the Optics and Photonics International Exhibition (OPIE) every year since 2012 at Pacifico Yokohama in Japan. OPIC hosts more than 10 specialized international conferences (SICs) each year, with new SICs added and the number of participants increasing each year. In the wide field of optics and photonics, it is important that various application developments are shared in one place and information is exchanged with each other, centering on common core technologies such as optical materials including nonlinear optics, laser light sources, photodetection, and optical active control. The main purpose of OPIC is to support the development of new academic and applied fields by providing an efficient platform to support the organization of meetings for the exchange of information among researchers, and promoting the development of emerging research. Since its founding in 2012, OPIC has evolved into one of the largest international technical conference events, providing an efficient opportunity for participants to interact on the latest advances in the science and technology of optics, photonics, and their applications.

Last year, OPIC 2023, which was positioned as the resumption of full-scale face-to-face conferences after the COVID-19 pandemic, hosted 13 SICs and welcomed 1,067 participants from 49 countries. The number of papers was 733. This confirmed once again that face-to-face technical exchange is a desirable format for researchers.

This year, OPIC 2024 consists of 16 SICs : Advanced Lasers and Photon Sources (ALPS); Business and Finance in Sustainable Society (BFSS); Biomedical Imaging and Sensing (BISC); High Energy Density Science (HEDS); Nano-photonics and Nano-optoelectronics (ICNN); Information Photonics (IP); Laser Displays and Lighting (LDC); Light-Emitting Devices and Their Industrial Applications (LEDIA); Laser and Synchrotron Combination Experiments (LSC); Laser Solutions for Space and the Earth (LSSE); Optical Manipulation and Structured Materials (OMC); Optical Technology and Measurement for Industrial Applications (OPTM); Optical Wireless and Fiber Power Transmission (OWPT); Smart Laser Processing (SLPC); Tiny Integrated Lasers and Laser Ignition (TILA-LIC); X-ray Optics and Applications (XOPT). Each technical conference has a unique program of interesting speakers, so we encourage registered attendees to attend presentations in multiple conferences. For more information, please visit each technical conference's website.

The organizers would like to thank everyone who submitted papers and the invited speakers who agreed to present their work at the meeting this year. We have made every effort to make this event beneficial to all participants, and we hope that OPIC 2024 will be fruitful and improve our shared communication.

Program at a Glance

*4/24: Room 302
4/25·26: Room 414+415

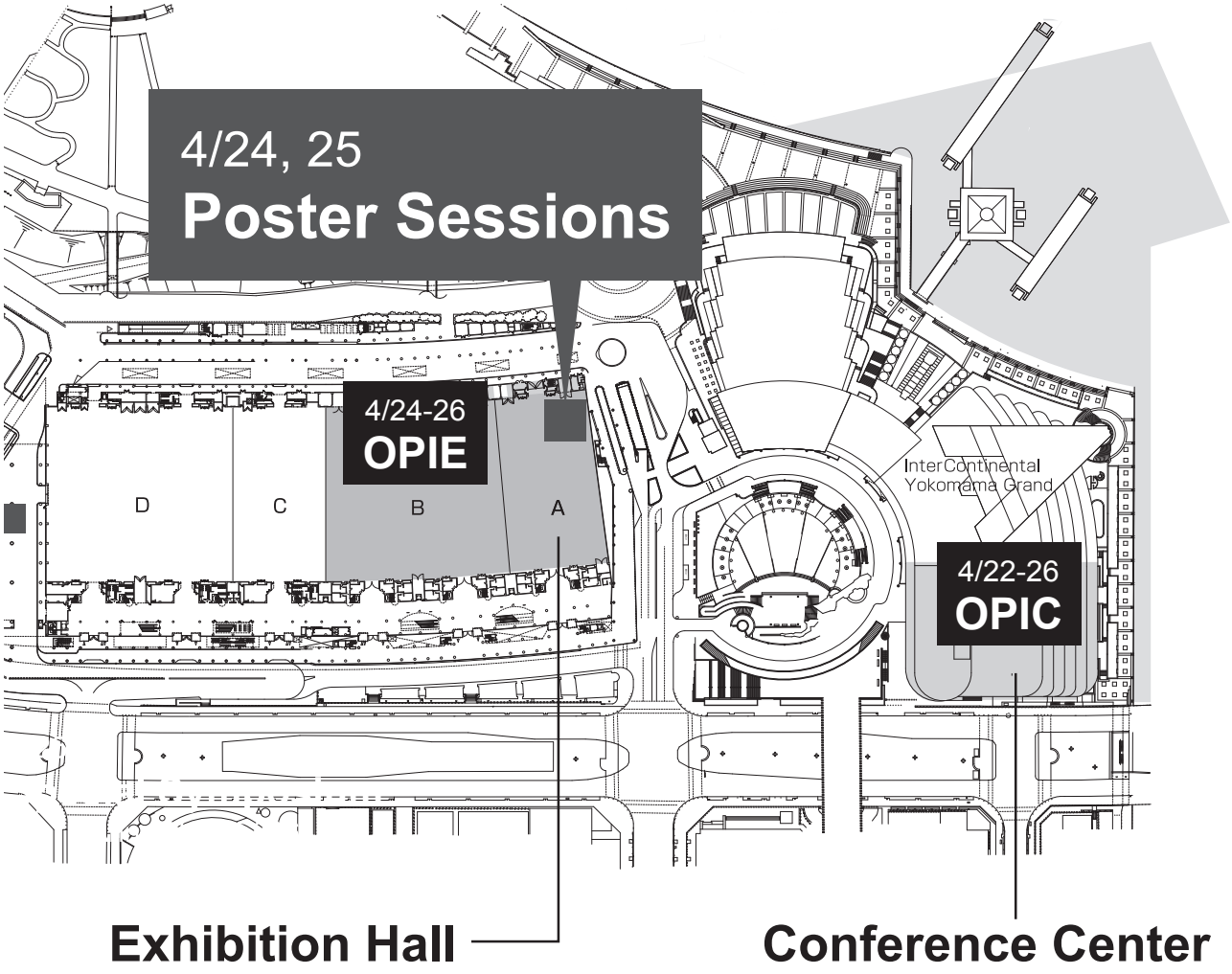
Date	Time \ Room	HEDS Room 311+312	XOPT Room 313+314	ALPS Room 303	ALPS Room 511+512	ALPS Room 413	BFSS Room 413	BISC Room 419	ICNN Room 414+415	IP Room 302 & 414+415
Mon 22 Apr.	10:00-			Opening Remarks (p.42)					Opening Remarks (p.42)	
	11:00-			ALPS1 (p.42-)	ALPS6 (p.42-)				ICNN1 (p.42)	
	12:00-			Lunch					Lunch	
	13:00-									
	14:00-			ALPS2 (p.44-)	ALPS7 (p.44-)	ALPS4 (p.44-)			ICNN2 (p.44-)	
	15:00-			Break	Break	Break			Break	
	16:00-			ALPS3 (p.46-)	ALPS8 (p.48)	ALPS5 (p.46-)			ICNN3 (p.46-)	
	17:30-	17:30-19:30 Welcome Reception <Bay Bridge Cafeteria (Conference Center 6th Floor)> (p.11)								
Tue 23 Apr.	9:00-	HEDS1 (p.50)	XOPT1 (p.52)	ALPS9 (p.50)						
	10:00-	Break	Break		ALPS15 (p.50-)	ALPS13 (p.50-)			ICNN4 (p.51)	
	11:00-	HEDS2 (p.54)	XOPT2 (p.56-)	ALPS10 (p.54-)					Break	
	12:00-	Lunch							ICNN5 (p.55)	
	13:00-								Lunch	
	14:00-	HEDS3 (p.58-)	XOPT3 (p.60-)	ALPS11 (p.58-)	ALPS16 (p.58-)	ALPS14 (p.58-)			ICNN6 (p.59-)	
	15:00-	Break	Break						Break	
	16:00-	HEDS4 (p.62-)	XOPT4 (p.64-)	ALPS12 (p.62-)	ALPS17 (p.62-)				ICNN7 (p.63-)	
Wed 24 Apr.	9:00-	HEDS5 (p.70)	XOPT5 (p.73)				Opening Remarks (p.70)			Opening Remarks (p.71)
	10:00-	Break					BFSS1 (p.70)	BISC1 (p.70-)		IP1 (p.71)
	11:00-	HEDS6 (p.74-)	XOPTp (p.77)	ALPSp1 (p.74-)			Break	Break	ICNNp (p.75-)	Break
	12:00-	Lunch			Lunch		BFSS2 (p.74)	BISC2 (p.74)		IP2 (p.75-)
	13:00-						BFSS3 (p.78)	Lunch		
	14:00-	HEDSp (p.79-)	Joint Session ALPS & HEDS & XOPT <Room 303> (p.82-)		ALPS18 (p.78-)		Break	BISC3 (p.78-)	ICNN8 (p.79-)	IP3 (p.79-)
	15:00-				Break		BFSS4 (p.82)	Break	Closing Remarks (p.87)	Break
	16:15-				ALPS19 (p.82-)		Closing Remarks (p.86)	BISC4 (p.86)		IP4 (p.87)
	19:10-	16:15-18:45 Plenary Session <Room 501+502> (p.15)								
		19:10-21:10 Banquet <Ballroom (InterContinental)> (p.11)								
Thu 25 Apr.	9:00-	HEDS7 (p.91)	XOPT6 (p.93-)	ALPS20 (p.90-)	ALPS24 (p.90)			BISC5 (p.90)		IP5 (p.90-)
	10:00-	Break	Break	Break				Break		Break
	11:00-	HEDS8 (p.95-)	XOPT7 (p.97-)	ALPSp2 (p.94-)			BFSSp (p.94-)	BISC6 (p.94-)		IP6 (p.99)
	12:00-	Lunch						Lunch		Lunch
	13:00-									
	14:00-	HEDS9 (p.102-)	XOPT8 (p.105)	ALPS21 (p.102-)	ALPS25 (p.102-)			BISCp (p.102-)		IPp (p.103-)
	15:00-	Break	Break		Break			Break		
	16:00-	HEDS10 (p.110-)	XOPT9 (p.109-)	ALPS22 (p.106-)	ALPS26 (p.106-)			BISC7 (p.106-)		
	17:00-			Break						
				ALPS23 (p.114)						
Fri 26 Apr.	9:00-	HEDS11 (p.116)						BISC8 (p.116)		IP7 (p.117)
	10:00-	Break		ALPS27 (p.116-)	ALPS30 (p.116-)			Break		Break
	11:00-	HEDS12 (p.120)		Break				BISC9 (p.120)		IP8 (p.121-)
	12:00-	Lunch		ALPS28 (p.120)				Lunch		Lunch
	13:00-			Lunch						
	14:00-	HEDS13 (p.124-)		ALPS29 (p.124-)	ALPS31 (p.124-)			BISC10 (p.124-)		IP9 (p.125-)
	15:00-	Break		Break				Break		
	16:00-	HEDS14 (p.132-)		Closing Remarks (p.132)				BISC11 (p.132-)		

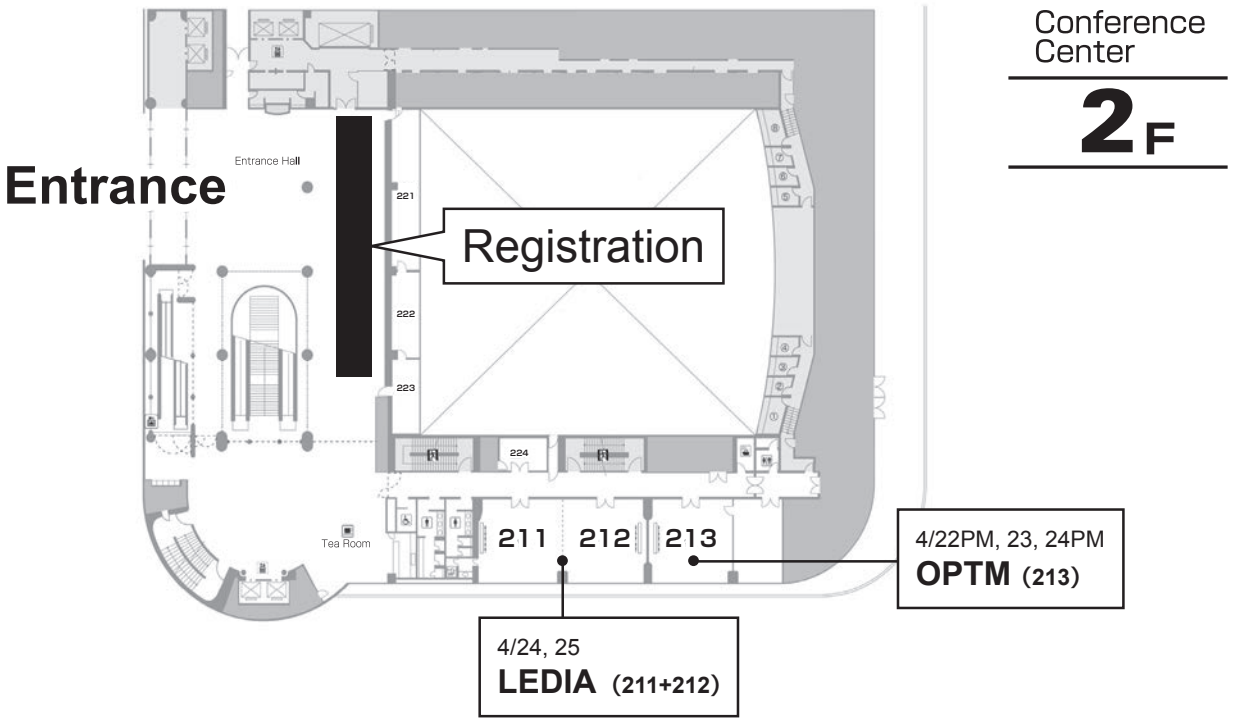
Plenary Joint Poster

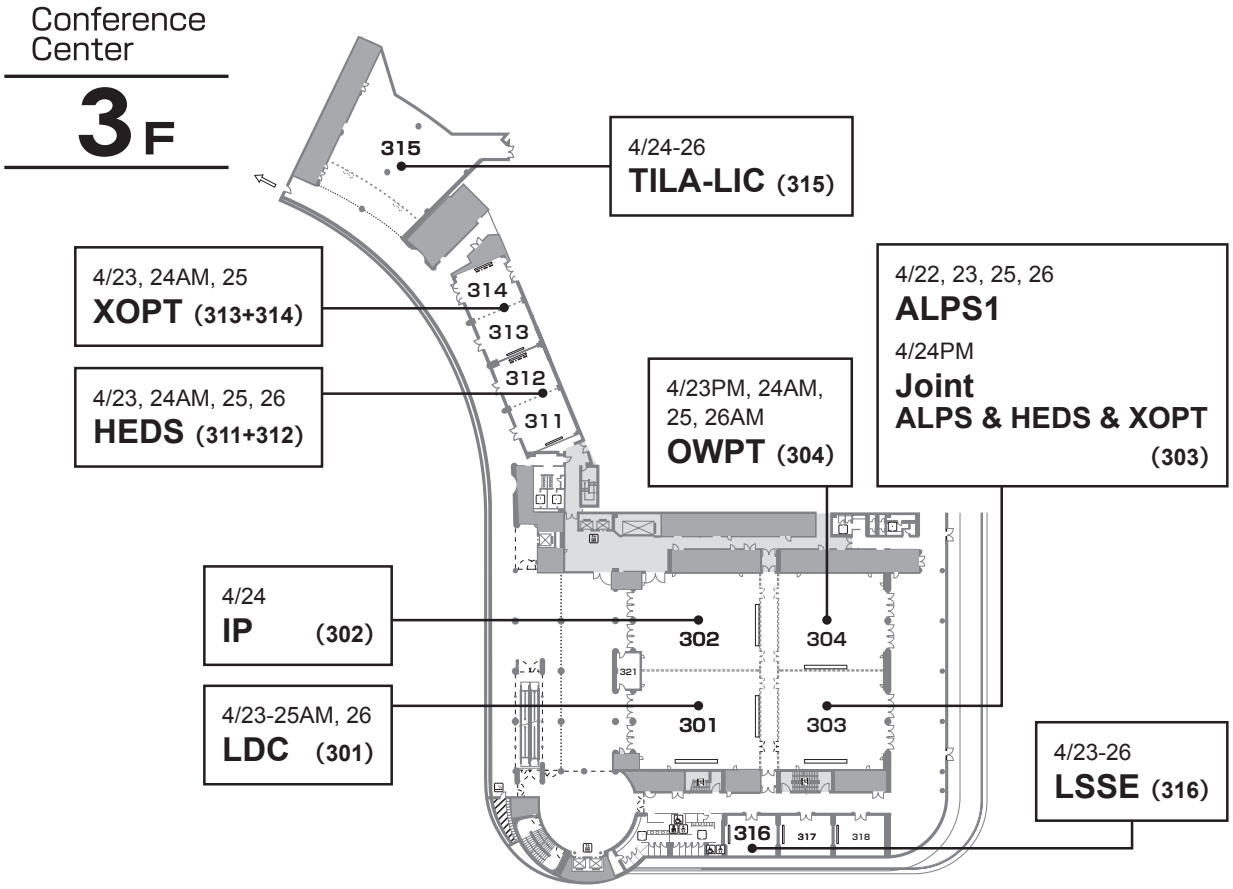
Room / Time	LDC Room 301	LEDIA Room 211+212	LSC Room 421	LSSE Room 316	OMC Room 418	OPTM Room 213	OWPT Room 304	SLPC Room 416+417	TILA-LIC Room 315
10:00-									
11:00-									
12:00-									
13:00-									
14:00-						Opening Remarks (p.45)			
15:00-						OPTM1 (p.45-)			
16:00-						Break			
17:30-						OPTM2 (p.47-)			
	17:30-19:30 Welcome Reception <Bay Bridge Cafeteria (Conference Center 6th Floor)> (p.11)								
9:00-	Opening Remarks (p.51)			LSSE1 (p.51)	OMC1 (p.51)	OPTM3 (p.52-)		Opening Remarks (p.52) SLPC1 (p.52-)	
10:00-	LDC1 (p.51)				Break			Break	
11:00-	Break LDC2 (p.55)			LSSE2 (p.55)	OMC2 (p.55-)	OPTM4 (p.56-)		SLPC2 (p.56-)	
12:00-	Lunch			Lunch				Lunch	
13:00-	LDC3 (p.59-)			LSSE3 (p.59)	OMC3 (p.59-)	OPTM5 (p.60-)	OWPT1 (p.60-)	SLPC3 (p.60-)	
14:00-					Break				
15:00-	Break					OPTM6 (p.64-)			
16:00-	LDC4 (p.63-)				OMC4 (p.63-)		OWPT2 (p.64-)	SLPC4 (p.64-)	
9:00-	LDC5 (p.71-)	LEDIA1 (p.71)		LSSE4 (p.72)	OMC5 (p.72)		OWPT3 (p.72-)	SLPC5 (p.73)	TILA-LIC1 (p.73)
10:00-	Break	Break			Break		Break	Break	Break
11:00-	LDC6 (p.75-)	LEDIA2 (p.75) LEDIA-SP (p.80-)		LSSE5 (p.76)	OMC6 (p.76-)	OPTMp (p.76-)	OWPT4 (p.76-)	SLPC6 (p.77)	TILA-LIC2 (p.77)
12:00-	Lunch			Lunch					
13:00-	LDC7 (p.79-)	LEDIAp (p.84)	LSC1 (p.80)	LSSE6 (p.80-)	OMC7 (p.80-)	OPTM7 (p.81)	OWPTp (p.81-)	SLPC7 (p.81-)	TILA-LIC3 (p.81)
14:00-		Break	Break		Break	Break		Break	Break
15:00-		Break LEDIA3 (p.84-)	LSC2 (p.84-)	Break LSSE7 (p.88)	OMC8 (p.84-)	OPTM8 (p.85)		SLPC8 (p.85-)	TILA-LIC4 (p.85-)
16:15-	16:15-18:45 Plenary Session <Room 501+502> (p.15)								
19:10-	19:10-21:10 Banquet <Ballroom (InterContinental)> (p.11)								
9:00-	LDC8 (p.91-)	LEDIA4 (p.91-)	LSC3 (p.92-)	LSSE8 (p.92-)	OMC9 (p.92-)		OWPT5 (p.92-)	SLPC9 (p.93-)	TILA-LIC5 (p.93)
10:00-	Break	Break	Break	Break	Break		Break	Break	Break
11:00-	LDC9 (p.99) LDC-SP (p.99)	LEDIA5 (p.95-)	LSC4 (p.96-)	LSSE9 (p.100)	OMC10 (p.96-)		OWPT6 (p.100)	SLPCp (p.97-)	TILA-LIC6 (p.97-)
12:00-	Lunch						Lunch		
13:00-	LDCp (p.103-)	LEDIA6 (p.103-)	LSC5 (p.103-)	LSSE10 (p.104-)	OMCp (p.104-)		OWPT7 (p.104-)	SLPC10 (p.104)	TILA-LICp (p.105-)
14:00-		Break	Break					Break	
15:00-		LEDIA7 (p.107)		LSSE11 (p.108-)	OMC11 (p.108-)		Break OWPT8 (p.108-)	SLPC11 (p.108) Break SLPC12 (p.108-)	Break TILA-LIC7 (p.109-)
16:00-			LSC6 (p.107-)					Closing Remarks (p.112)	
17:00-									
9:00-	LDC11 (p.117)		LSC7 (p.117)	LSSE12 (p.117)	OMC12 (p.118)		OWPT9 (p.118-)		TILA-LIC8 (p.118-)
10:00-	LDC12 (p.117)		Break		Break		Break		Break
11:00-	Break LDC13 (p.121)		LSC8 (p.121)	LSSE13 (p.121)	OMC13 (p.122)		OWPT10 (p.122)		TILA-LIC9 (p.122)
12:00-	Lunch			Lunch					Lunch
13:00-	LDC14 (p.125)			LSSE14 (p.125-)	OMC14 (p.125-)				TILA-LIC10 (p.126-)
14:00-	Break								
15:00-	LDC15 (p.129-)				Break				TILA-LIC11 (p.134)
16:00-	Break LDC16 (p.133-)				OMC15 (p.133-)				
	Closing Remarks (p.137)								

Floor Plan

Pacifico Yokohama

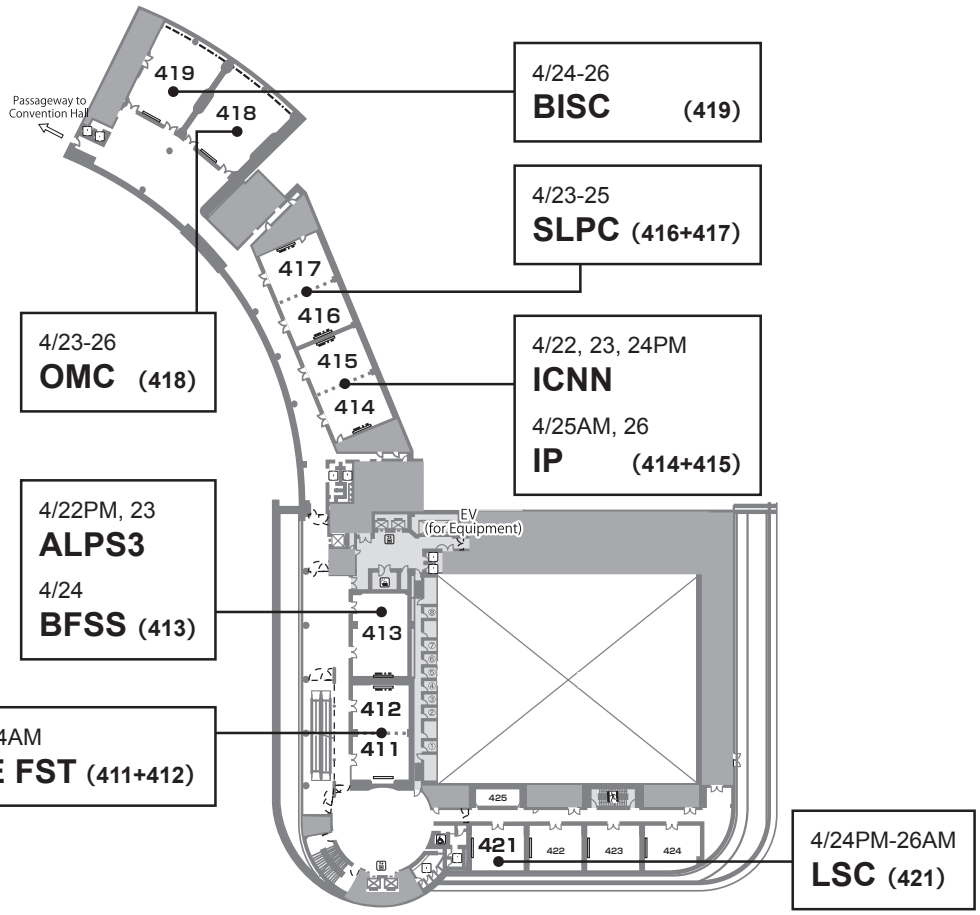



Conference Center
2F
Entrance
Entrance Hall
Registration
221
222
223
224
Tea Room
211
212
213
4/22PM, 23, 24PM
OPTM (213)
4/24, 25
LEDIA (211+212)


Conference Center
3F
315
4/24-26
TILA-LIC (315)
4/23, 24AM, 25
XOPT (313+314)
314
313
312
311
4/23, 24AM, 25, 26
HEDS (311+312)
4/23PM, 24AM, 25, 26AM
OWPT (304)
4/22, 23, 25, 26
ALPS1
4/24PM
Joint
ALPS & HEDS & XOPT
(303)
4/24
IP (302)
302
304
321
4/23-25AM, 26
LDC (301)
301
303
4/23-26
LSSE (316)
316
317
318

Conference Center

4 F



4/24-26
BISC **(419)**

4/23-25
SLPC **(416+417)**

4/23-26
OMC **(418)**

4/22, 23, 24PM
ICNN
4/25AM, 26
IP **(414+415)**

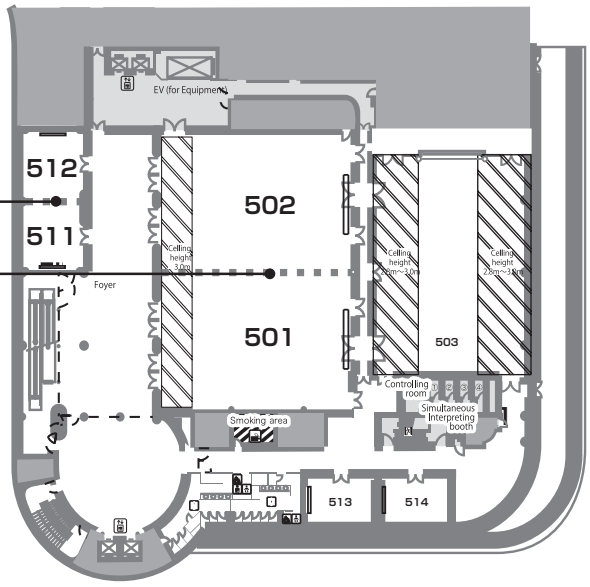
4/22PM, 23
ALPS3
4/24
BFSS **(413)**

4/22-24AM
SPIE FST **(411+412)**

4/24PM-26AM
LSC **(421)**

Conference Center

5 F



4/22, 23, 24PM-26
ALPS2 **(511+512)**

4/24 16:15-18:45
Plenary Session
(501+502)

OPIC 2024 Congress Committees

Congress Chairs

Toyohiko Yatagai
Utsunomiya University, Japan

Irina Sorokina
Norwegian University of Science and Technology

Kishan Dholakia
University of St. Andrews, UK

Din Ping Tsai
City University of Hong Kong

Shuji Sakabe
Professor Emeritus,
Kyoto University, Japan

International Advisory Board

<Chair>

Yoshiaki Kato *Professor Emeritus, Osaka University, Japan*

<Members>

Christopher P.J. Barty *Distinguished Professor of Physics and Astronomy, University of California, Irvine, USA*

Sergei Bulanov *Leader for ERT/HiFi project, Head of Department 86, ELI Beamlines Facility, The Extreme Light Infrastructure ERIC, Czech Republic*

Kenichi Iga *Honorary Professor/Former President, Tokyo Institute of Technology, Japan*

Masanori Iye *Member of the Japan Academy, Professor Emeritus of the National Astronomical Observatory of Japan, Japan*

Chandrashekhar Joshi *Distinguished Chancellor's Professor, University of California, Los Angels, USA*

Ken-ichi Kitayama *Professor Emeritus, Osaka University, Japan*

Reiko Kuroda *Designated Professor, Chubu University, Professor Emeritus, The University of Tokyo, Japan*

Ruxin Li *Academician of the Chinese Academy of Sciences, Dean of the Shanghai Institute of Optics and Fine Mechanics, CAS, Vice President of Shanghai Tech University, China*

Chang Hee Nam *Director, Center for Relativistic Laser Science (CoReLS), Institute for Basic Science, Korea*

Reinhart Poprawe *Professor Emeritus RWTH-Aachen University, CEO ETERNATECH GmbH, Germany*

Organizing Committee

<Chair>

Fumihiko Kannari *Professor Emeritus, Keio University, Japan*

<Vice Chair>

Takashige Omatsu *Chiba University, Japan, OMC*

<Members>

Hitoki Yoneda *The University of Electro-Communications, Japan, ALPS*
Rie H. Kang *The Graduate School for the Creation of New Photonics Industries, Japan, BFSS*
Osamu Matoba *Kobe University, Japan, BISC*
Yasuhiro Awatsuji *Kyoto Institute of Technology, Japan, BISC*
Izumi Nishidate *Tokyo University of Agriculture and Technology, Japan, BISC*
Ryosuke Kodama *Osaka University, Japan, HEDS*
Takayoshi Sano *Osaka University, Japan, HEDS*
Yasuhiko Arakawa *The University of Tokyo, Japan, ICNN*
Yoshio Hayasaki *Utsunomiya University, Japan, IP*
Kazuo Kuroda *Professor Emeritus, The University of Tokyo, Japan, LDC*
Hiroshi Murata *Mie University, Japan, LDC*
Hiroshi Amano *Nagoya University, Japan, LEDIA*
Toshihiko Shimizu *Osaka University, Japan, LSC*
Satoshi Wada *RIKEN, Japan, LSSE*
Toru Yoshizawa *NPO 3D Associates, Japan, OPTM*
Yukitoshi Otani *Utsunomiya University, Japan, OPTM*
Tomoyuki Miyamoto *Tokyo Institute of Technology, Japan, OWPT*
Motoharu Matsuura *The University of Electro-Communications, Japan, OWPT*
Masahiro Tsukamoto *Osaka University, Japan, SLPC*
Takunori Taira *RIKEN, Japan, TILA-LIC*
Tetsuya Ishikawa *RIKEN, Japan, XOPT*
Kazuto Yamauchi *Osaka University, Japan, XOPT*
Mitsutoshi Hatori *OPI Council, President, Japan Photonics Council*
Nobuyuki Kondo *OPI Council, Charman, Japan Laser Corporation*
Mitsuo Takeda *OPI Council, Utsunomiya University, Japan*
Katsumi Midorikawa *OPI Council, Director, RIKEN Center for Advanced Photonics, Japan*
Kenichi Ueda *Professor Emeritus, The University of Electro-Communications, Japan*
Peter Hallett *SPIE, USA*

Steering Committee

<Chair>

Osamu Matoba *Professor, Kobe University, Japan*

<Vice Chair>

Kazuhisa Yamamoto *Professor, Osaka University, Japan*

<Secretary>

Masaki Hisaka *Osaka Electro-Communication University, Japan*

<Members>

Hiyori Uehara *National Institute for Fusion Science, Japan, ALPS*
Yurina Michine *Institute for Laser Science, The University of Electro-Communications, Japan, ALPS*
Ryohei Hanayama *The Graduate School for the Creation of New Photonics Industries, Japan, BFSS*
Yasuhiro Awatsuji *Kyoto Institute of Technology, Japan, BISC*
Izumi Nishidate *Tokyo University of Agriculture and Technology, Japan, BISC*
Takayoshi Sano *Osaka University, Japan HEDS*
Satoshi Iwamoto *The University of Tokyo, Japan, ICNN*
Wakana Kubo *Tokyo University of Agriculture and Technology, Japan, ICNN*
Yusuke Ogura *Osaka University, Japan, IP*
Norihiro Ohse *Sony Group, Japan, LDC*
Muneharu Kuwata *Mitsubishi Electronic, Japan, LDC*
Yoshio Honda *Nagoya University, Japan, LEDIA*
Nobuhiko Sarukura *Osaka University, Japan, LSC*
Hiroki Wadati *University of Hyogo, Japan, LSC*
Noboru Hasegawa *National Institutes for Quantum and Radiological Science and Technology, Japan, LSSE*
Akihiko Nishimura *Japan Atomic Energy Agency, LSSE*
Katsuhiko Miyamoto *Chiba University, Japan, OMC*
Yukitoshi Otani *Utsunomiya University, Japan, OPTM*
Ryoichi Kuwano *Hiroshima Institute of Technology, Japan, OPTM*
Tomoyuki Miyamoto *Tokyo Institute of Technology, Japan, OWPT*
Motoharu Matsuura *The University of Electro-Communications, Japan, OWPT*
Yuji Sato *Osaka University, Japan, SLPC*
Yoichi Sato *RIKEN SPring-8 Center, Japan, TILA-LIC*
Hiroyuki Takigami *RIKEN SPring-8 Center, Japan, TILA-LIC*
Yuya Kubota *RIKEN SPring-8 Center, Japan, XOPT*
Takato Inoue *Nagoya University, Japan, XOPT*

Schedule-at-a-Glance

	Monday 22 April	Tuesday 23 April	Wednesday 24 April	Thursday 25 April	Friday 26 April
GENERAL					
Registration	8:00-16:30	8:00-16:30	8:00-16:30	8:00-16:30	8:00-14:00
Coffee Breaks	15:00-15:30	10:30-11:00 15:00-15:30	10:30-11:00 14:45-15:15	10:30-11:00 15:00-15:30	10:30-11:00 15:00-15:30
Receptions <*1 Conference Center 6F> <*2 InterContinental 3F>	17:30-19:30 Bay Bridge Cafeteria*1		19:10-21:10 Ballroom*2		
OPIC Technical Programing					
Technical Sessions	9:50-17:00	8:45-17:15	8:50-16:00	8:30-17:30	9:00-17:05
Plenary Session <Room 501+502>			16:15-18:45		
Joint Session ALPS & HEDS & XOPT <Room 303>			14:15-15:45		
Poster Sessions <Exhibition Hall A>			10:30-12:00 13:30-15:00	10:30-12:00 13:30-15:00	
OPIE AND SHOW FLOOR ACTIVITIES					
OPIE <Exhibition Hall A,B>			10:00-17:00	10:00-17:00	10:00-17:00
Poster Session Lunch <Exhibition Hall A>			12:15-13:00	12:15-13:00	
Poster Session Dessert <Exhibition Hall A>			14:45-15:15	14:45-15:15	

General Information

Registration

Pacifico Yokohama, Conference Center 2F Lobby

Registration Hours	
Monday, 22 April	8:00 - 16:30
Tuesday, 23 April	8:00 - 16:30
Wednesday, 24 April	8:00 - 16:30
Thursday, 25 April	8:00 - 16:30
Friday, 26 April	8:00 - 14:00

Exhibition

Exhibition Hall A,B

OPIE '24 (Exhibition) is open to all registered attendees. Schedule plenty of time to roam the halls, visit with the hundreds of companies represented and see the latest products and technologies. For more information about what's happening on the exhibit floor, see pages 154-155.

Exhibition Hours	
Wednesday, 24 April	10:00 - 17:00
Thursday, 25 April	10:00 - 17:00
Friday, 26 April	10:00 - 17:00

Conference Information Desk

The Conference Information Desk is for any information concerning the OPIC conferences. Staff will be equipped to help you understand the program book, find room locations, and accept small Lost and Found items, and will operate during registration hours.

Free High-Speed Wireless LAN (Wi-Fi)

How to connect to Wi-Fi

Go to Settings > Wi-Fi on your mobile
and tap join SSID: FREE-PACIFICO

Lost/Found Items

Central Disaster Control Center

Report a lost/found item to the Central Disaster Control Center.

Exhibition Hall B1F

TEL: +81-45-221-2127 (24 hours open)

Business Center

Kinko's (Business Center)

Conference Center 1F and Exhibition Hall 2F

Open Hours 9:00 - 18:00 (except 22 April)

Services : Printing (Digital/Offset), Copying machines, FAX machines, Scanning

TEL: +81-45-222-7025

ATM

7-Eleven (7:00 to 21:00)

Exhibition Hall 2F

With Seven Bank ATM, displaying 12 languages, you can withdraw Japanese yen from cash cards and credit cards issued overseas. Tax-free services are available.

Daily YAMAZAKI (7:00 to 18:00)

Exhibition Hall 1F

With E-Net ATM, you can withdraw Japanese yen.

Foreign Exchange

There is a foreign currency exchange machine on the 2nd floor of the InterContinental Yokohama Grand.

First Aid Room

Conference Center 1F and Exhibition Hall 1F

Equipment: Wheelchairs, beds, AED, stretchers

Dial 119 in case of an accident or a medical emergency.

AED (Automated External Defibrillator)

An AED is used to treat ventricular fibrillation.

AEDs are available in the following locations.

Conference Center: In front of First Aid Room (1F)

Exhibition Hall: In front of First Aid Room (1F) and at Security Office (B1F)

Coin Lockers

Conference Center	Size	Price / day
1F	Small	¥300
2F	Small	¥300
	Medium	¥400
	Large	¥600

Exhibition Hall	Size	Price / day
1F	Small	¥300
	Medium	¥400
	Large	¥500
	Extra Large	¥600
2F	Small	¥300
	Large	¥500

Smoking Areas

This is a non-smoking complex and smokers are advised to use designated smoking areas.

Convention Center 3F/5F, Annex Hall

Exhibition Hall 1F

Post Office

- Queen's Square Yokohama Post Office

  Queen's Square 1F

  TEL: +81-45-682-0280

  Counter: 9:00 to 17:00 *Weekdays

  ATM: 8:00 to 21:00 *Weekdays and Saturday

  8:00 to 20:00 *Sunday
- Yokohama Central Post Office

  Yokohama Station East Exit

  TEL: +81-570-943-212

  Counter: 0:00 to 21:00 *Weekdays

  9:00 to 18:00 *Saturday, Sunday, and holiday

  ATM: 7:00 to 23:00 *Weekdays and Saturday

  7:00 to 21:00 *Sunday and holiday

Express Delivery Service

Available at temporary Yamato Transport "Takkyubin" Delivery Service counter and Business Center

Business Center (Yamato Transport, Yu-pack and FedEx)

Exhibition Hall 2F Logistics Center (9:00 to 18:00 Occasionally closed)

Available Yamato Transport Service at Daily

Daily YAMAZAKI (Exhibition Hall 1F)

7-Eleven (Exhibition Hall 2F)

Information Desk

Providing information on facilities, events, sight-seeing, etc.

Conference Center 2F

TEL: +81-45-221-2155 (9:00 to 17:00)

OPIC 2024 have received the financial support from the following organizations.

公益財団法人 天田財団 THE AMADA FOUNDATION

NICT National Institute of Information and Communications Technology

公益財団法人 日本板硝子材料工学助成会
Nippon Sheet Glass Foundation for Materials Science and Engineering

Tsurugi-Photonics Foundation

公益財団法人 横浜観光コンベンション・ビューロー
YOKOHAMA CONVENTION & VISITORS BUREAU

OPIC 2024 thanks the following corporate sponsors for their generous support:

＜Industry Sponsors＞

OPTO SCIENCE, INC.

SPIE.

OKAMOTO OPTICS 株式会社 オカモトオプティクス

HAMAMATSU PHOTON IS OUR BUSINESS

JLC JAPAN LASER

＜International Partner＞

SPIE.

＜Media Partner＞

PHOTONICS MEDIA

OPTRONICS

OPIC 2024 Plenary Session

Pacifico Yokohama Conference Center, Room 501+502
Wednesday 25 April, 16:15 - 18:45

16:15 - 17:05

Chair: Toyohiko Yatagai, *Chair of OPIC 2024, Professor of Utsunomiya University, Japan*

Bernard Kress, *Director, XR Engineering, Google, USA*

"Optics and Photonics as key enabling technologies for smart glasses"

17:05 - 17:55

Chair: Fumihiko Kannari, *Chair of OPIC 2024 Organizing Committee, Professor Emeritus of Keio University, Japan*

Fatima Bencheikh, *Co-founder, CEO/CTO of KOALA Tech. Inc., Japan*

"Organic semiconductor laser diode: challenges and perspectives"

17:55 - 18:45

Chair: Yoshiaki Kato, *Chair of OPIC 2024 International Advisory Board, Professor Emeritus of Osaka University, Japan*

Markus Roth, *Co-founder, Focused Energy Inc., USA*

"Proton Fast Ignition as a path to commercial fusion energy"

Plenary Session

Plenary Speech

Optics and Photonics as key enabling technologies for smart glasses

Bernard Kress, PhD
Director, XR Engineering, Google, USA
2023 President of the International Society of Optics and Photonics (SPIE.org)
Bernard.kress@spie.org

Abstract

Optics and Photonics have been proven to be key enabling technologies for all constituting sub-systems in next generation smart glasses, such as in display sub-system, sensor sub-system and imaging sub-system. Consumer mass adoption of AR headsets is conditioned by solving all three immersive displays comfort pillars: wearable, visual and social. To do so, new micro- and nano-fabrication challenges need to be addressed, specifically more efficient waveguide combiners and smaller display engines and coherent sensor fusion systems. Novel nanofabrication techniques are needed to improve the performance of flat optical display systems while allowing for mass production at consumer cost levels. Such novel nano-fabrication technologies push the envelope beyond what is possible today with traditional nano-imprint lithography.

Current AR market segmentation

Over the past decade, augmented reality headset products which were originally marketed for consumers such as Google Glass 1, HoloLens 1 and Magic Leap 1 only echoed with enterprise, industry and defense markets, and thus their second versions were solely optimized and dedicated to cater to these specialized fields (Google Glass enterprise, HoloLens 2 and MagicLeap 2, as well as the defense headset from Microsoft, IVAS – Integrated Visually Augmented System) for which the US Army allowed a whopping $22B budget spend over a decade. Many start-ups which had strong VC fundings also fall short of echoing with and went belly up over the past few years (Daqri, MetaVision, ODG, …).

Today, the advent of Artificial Intelligence (AI), especially Large Language Models (LLM) allowed for a new and unique opportunity to address smart glass consumer market. Many large companies refer to these glasses as AI Glasses. The table below reviews the current market segmentation for AR devices.

AR display systems for smart glasses

The key to low form factor and all day use smart glasses is lying in the choice of components for the display sub-assembly (DSA) and sensing sub-assembly systems

	Audio glasses	Monocular smart glasses	Binocular smart glasses	AR goggles	Optical see-through headsets	Video pass-through headsets
Weight	<30 g	<45 g	<75 g	<150 g	<400 g	<600 g
Form factor	Smart glasses	Smart glasses	Smart glasses	Goggles	OST see through	VST see through
Power	<1/2W	<1W	<1.5W	<2.5W	<6W	<8W
Immersion	Audio	<20 deg monocular	20-30 deg Binocular	30-50 deg Binocular	>50-70 deg Binocular	>90 deg FOV
Display lock	No display, Audio world lock	Body locked	World locked	World locked	Occlusions, spatial anchors	All of the above
Sensors	PV camera, Voice, IMU	+ Eye Tracking, Wink, …	+ 3 DOF Head Tracking (HeT)	+ 6 DOF HeT, Gesture sensing,	+ Face tracking, spatial mapping	+ Occlusion
Apps	Audio apps	Contextual display	Flat apps	3D apps	Scene apps	Spatial Computing
Example	Ray Ban stories, Bose, Echo frames	Google Glass, Tooz smart glasses,…	Vuzix Blade, Digilens Crystal 30,…	nReal light, Lenovo A3 ThinkReality, ,…	Magic Leap 2, Hololens 2,	Lynx VR, Oculus Quest Pro, Apple Vision Pro…

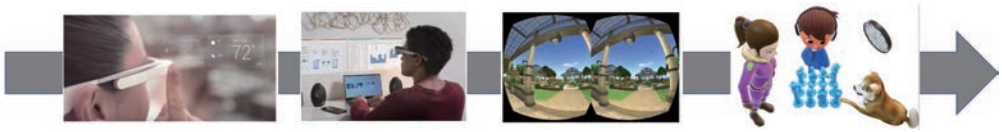


Fig 1: Current AR headset market segmentation from audio glasses, to ambient AR smart eyewear, binocular smart glasses, to Optical See Through (OST) and Video See Through (VST) headsets.

(SSA). The DSA system is usually constituted by a light engine, located in the temple frames area, which generates the image and provides an exit pupil to the optical combiner. Fig 2 reviews the main panel architectures used today in smart glasses, ranging from LTPS LCD, LCoS (Liquid Crystal on Silicon), DLP MEMS (Digital Light Processing), microOLED (Organic LED) to the latest, -and yet still in development- , microLED panels.

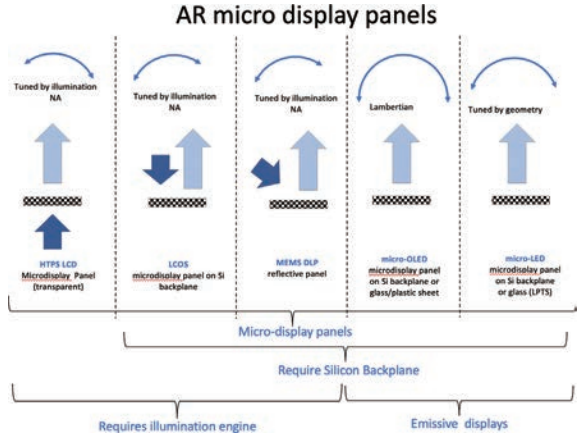


Fig.2: AR display panels used in smart glasses

The exit pupil of the light engine provides the input pupil to the combiner optics. The optical combiner overlays the digital image with the see-through field and in many cases also provides a pupil expansion. The pupil expansion can be done in many ways, but the state of the art combiner optics for smart glasses use waveguide combiners based either on bird bath architectures (such as xReal) or waveguides (HoloLens, MagicLeap). The waveguide combiners have a thinner form factor and can have holographic, diffractive or geometric reflective couplers which replicate the input pupil in a 2D array. Fig. 3 review the main architectures used today in smart glasses.

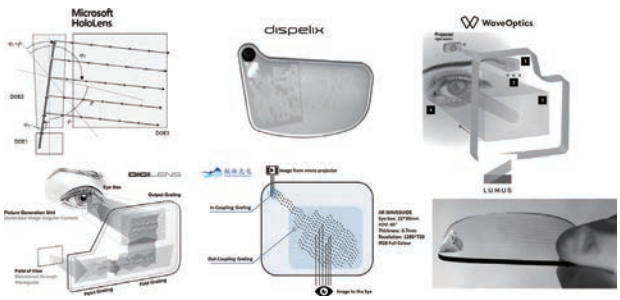


Fig. 3: Waveguide combiners used in smart glasses

Nano Imprint Lithography (NIL) is the main replication technique used for diffractive waveguides mass production. Another variety of light engines are the LBS MEMS (Laser Beam Steering) systems. They are be implemented in a variety of ways, not only providing image generation but also wobulation, field of view expansion and optical foveation. Fig. 4 review the various architectures.

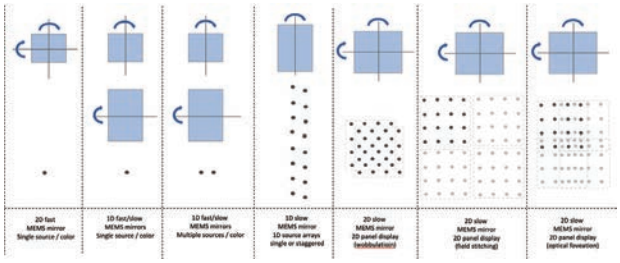


Fig. 4: LBS MEMS architectures for smart glasses

Next generation display systems

In order to reduce the form factor and free up the space in the temple regions, other display architectures are now investigated by various companies (Lusovu, New Sight Reality, Nvidia, etc…) to provide a planar display engine on the waveguide combiner, and open a new paradigm in the traditional display configuration as it was used in VR and AR systems up to now (Fig. 5).

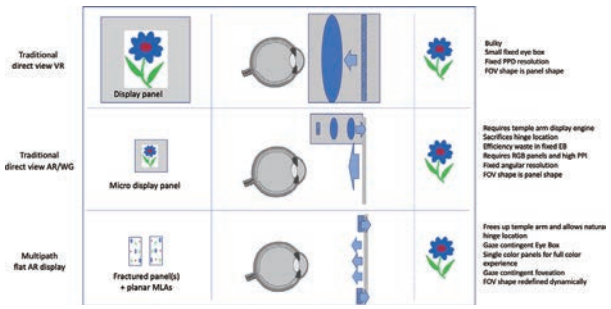


Fig. 5: Next Gen planar AR display architectures

Short Bio

Bernard published several books, is listed as the main inventor on close to 120 patents and wrote a few hundred papers covering micro-optics technologies and related product architectures.

He is the 2023 President of the International Society for Optics and Photonics (SPIE) and the chair of SPIE AR|VR|MR and DOT conferences. Bernard held engineering management positions at Google [X] Labs since 2010 (Google Glass project) and Microsoft since 2015 (HoloLens project). He is since 2022 the Director for XR Engineering at Google in Mountain View, USA.

Plenary Speech

Organic semiconductor laser diode: challenges and perspectives

Fatima Bencheikh, Ph.D.
Co-founder, CEO/CTO of KOALA Tech. Inc.
Visiting associate professor, OPERA, Kyushu University
Fatima.bencheikh@koalatech.co.jp

Abstract

Organic lasers have the potential to add value to OLED technology, expanding its applications by providing highly directional monochromatic light. In this talk, we will discuss a comprehensive investigation of the influence of exciton and photon losses on the performances of organic semiconductor laser diodes. Our findings indicate that the exciton loss affects the laser threshold while the slope efficiency remains unaffected. Conversely, photon losses affect both the lasing threshold and slope efficiency.

Content

Organic semiconductor laser diodes (OSLDs) bring together the best features of organic light-emitting diodes (OLEDs) and lasers. They can achieve highly directional, monochromatic light emission and a compact design across various wavelengths, making them a promising choice for the next generation of light sources. In 2019, a significant breakthrough showcased the lasing behavior in OSLD [1]. Subsequently, KOALA Tech has been dedicated to advancing the performance of OSLD.

OSLD consists of an OLED (Fig. 1a) with a resonator as shown in Fig. 1b. There are several types of resonators compatible with organic gain media including Fabry-Perot microcavities, distributed feedback (DFB) resonators, distributed Bragg resonators, micro-rings, micro-discs, and microsphere cavities. DFB resonators stand out as widely employed resonators, enabling the attainment of a low lasing threshold under optical excitation.

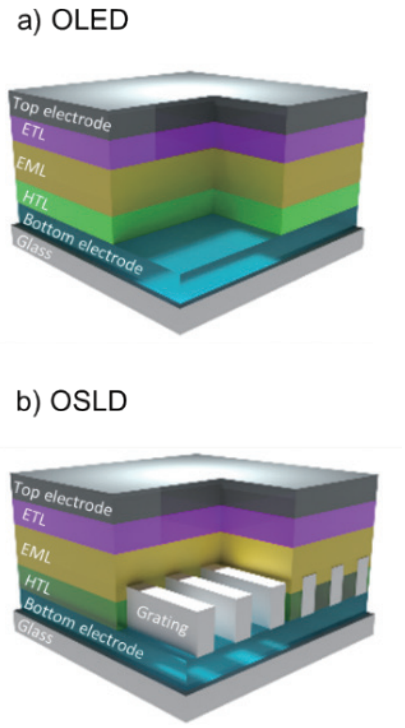


Fig. 1: Schematic representation of a) OLED and b) OSLD.

Importantly, OSLDs can be made using equipment like that used in OLED technology and be compatible with the silicon platform, potentially revolutionizing smart displays with integrated sensors and multifunctionality.

In contrast to optically pumped organic lasers where losses are minimal owing to transparent surrounding materials (substrate and cover) and the absence of charge injection, electrically driven OSLDs face additional challenges with photon and exciton losses. Consequently, it becomes imperative to significantly enhance the gain and/or reduce losses for the advancement of OSLD technology.

This talk will review the influence of various loss mechanisms on the OSLD's performances [2]. These losses fall into two categories: those associated with singlet excitons and those related to photons. Singlet exciton losses mainly arise from bimolecular interactions such as singlet-singlet annihilation, singlet-triplet annihilation, singlet-polaron annihilation, metal contact quenching, electric field-induced exciton dissociation, and Joule heating. In contrast, photon losses result from absorption by singlet excitons, triplet excitons, polarons,

or metallic contacts. Fig. 2 shows an illustration depicting the exciton and photon losses as well as optical feedback and outcoupling in an OSLD. Photons that manage to persist through the losses are reflected back and forth by the grating within the gain medium, initiating lasing when the gain surpasses the losses.

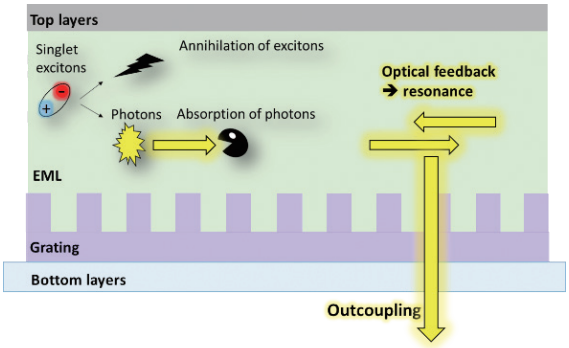


Fig. 2: Illustration depicting the exciton and photon losses as well as optical feedback and outcoupling in an OSLD.

Numerical analysis was conducted to investigate the impact of the various exciton and photon losses on the laser threshold and slope efficiency by solving the laser rate equations. Our findings indicate that the change of exciton loss rate is proportional to the laser threshold, while the slope efficiency remains unaffected. Conversely, photon losses affect both the lasing threshold and slope efficiency. The lasing threshold is proportional to the photon loss and the slope efficiency is inversely proportional to these losses.

Additionally, we explored the role of triplet excitons in TADF-based organic lasers. Our results demonstrate that increasing the rate of reverse intersystem crossing reduces triplet density, promoting laser emission through reverse intersystem crossing and boosting photon density. This process lowers the laser threshold by using triplet excitons and mitigating triplet-related losses.

Reference

[1] Atula S. D. Sandanayaka et al., 2019, Appl. Phys. Express, 12, 061010.

[2] Sahar Alasvand Yazdani et al., 2022 Jpn. J. Appl. Phys., 61, 074003.

Fatima Bencheikh, Ph.D., is the chief executive and technology officer of Koala Tech. Inc. and a visiting associate professor at Kyushu University. Her research interest is organic optoelectronic devices with a focus on OLED and organic semiconductor lasers. She received her Ph.D. degree in micro and nanoelectronics from Aix-Marseille University, France. Eager to discover a new way of life and new work culture, she moved to the land of the rising sun, Japan in 2016. From 2016 to 2019, she has been working as a postdoctoral fellow under the supervision of Prof. Chihaya Adachi at Kyushu University. In March 2019, Fatima Bencheikh co-founded a startup venture named KOALA Tech. Inc., an innovative high-tech startup company; whose goal is to pioneer practical applications of OSLDs that have been recently realized at Kyushu University.

Plenary Speech

Proton Fast Ignition as a path to commercial fusion energy

Markus Roth, Ph.D.
Co-founder, Focused Energy Inc.
Chief Science Officer
markus.roth@focused-energy.world

Abstract

The first successful ignition of a fusion reaction and the first demonstration of scientific energy gain have changed the direction of fusion research from fundamental research towards the question of how commercial energy production can be achieved. Focused Energy is a US/German startup working to commercialize fusion energy. Over the last two years we have gathered the best laser fusion scientists from both sides of the Atlantic. Upon a careful analysis of all the individual aspects of laser fusion Focused Energy has chosen the direct-drive, proton fast ignition approach as, to our belief, the most robust pathway to commercialize laser fusion energy. This talk will present our considerations, based on many decades of research around the globe, and our roadmap towards a first fusion reactor by the end of the next decade.

Content

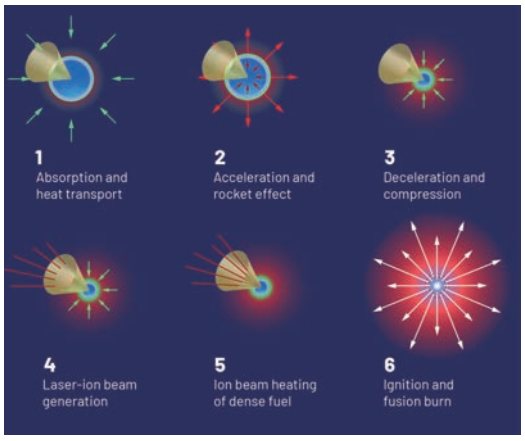
Fusion energy, the last of all energy sources in the universe that mankind has not exploited, has the potential to solve the energy problems of mankind in the second part of the century. Despite fusion being the most difficult experiment mankind has ever made, recently the successful demonstration of ignition, burn and energy production from laser-driven inertial fusion has shown the vast potential of this energy source. But how do we get from a laser, which consumed 400 MJ of electrical energy to deliver 2MJ of laser energy, which resulted in close to 4MJ of fusion energy, to a working power plant that uses less than 20% of its own energy to run and delivers GW of electrical power to the grid?

This was the main challenge Focused Energy started to address in 2021. Focused Energy is a small startup company with headquarters in Austin, Texas, US and Darmstadt, Germany. We teamed up the best scientists in laser fusion from Europe and the US and started to investigate the individual aspects changing a fundamental experiment into a power plant design:

First, the laser system must be transformed from the unique design of the Lawrence Livermore National Laboratory (LLNL) National Ignition Facility (NIF), based on 1980's flash-lamp pumped technology to a modern, high rep-rate, diode pumped laser system with much better wall-plug efficiency.

Next, the lossy and material intense approach of indirect drive (using a Hohlraum to convert laser radiation into x-rays first) has to be replaced by the more efficient direct-drive approach. This transition requires control of laser-plasma instabilities (LPI) and the symmetry of the driving combined laser field.

One of the challenges of the common central hot-spot ignition is the combined task of fuel compression and heating, leading to high laser intensities and a strong vulnerability on hydrodynamic instabilities. Thus, FE has chosen to separate the compression and heating into two steps.



Direct-Drive, Proton Fast Ignition using a cone-guided capsule

The benefit of an external driver to heat the compressed fuel is a reduction in symmetry requirements, which allows for cheaper target production and more tolerance to laser imprint. FE has therefore chosen the so-called fast ignition approach. This approach also promises

a higher burn-up rate and thus a larger energy gain.

The heating of the very dense hot spot by laser driven particle beams has been investigated over decades now. Based on more than 25 years of research FE believes a laser-driven proton beam to be the best choice for fuel ignition.

For a commercial power plant, up to a million targets have to be produced and injected into the reactor vessel. This will be possible using self-organizing production schemes currently being developed at FE.

A reactor must operate at extreme conditions and the material is exposed to high levels of radiation. A careful choice of the materials is crucial to produce energy at a cost that matches the needs of customers.

In the quest for fusion energy there are many different approaches being followed by public and private entities. The magnetic confinement fusion (MCF) approach has a few decades and much more funding as a head start compared to inertial fusion energy (IFE). However, the intrinsic benefits of laser fusion are the modularity of the approach, where individual components can be developed and tested in parallel and even exchanged in a combined system, when better solutions are available.

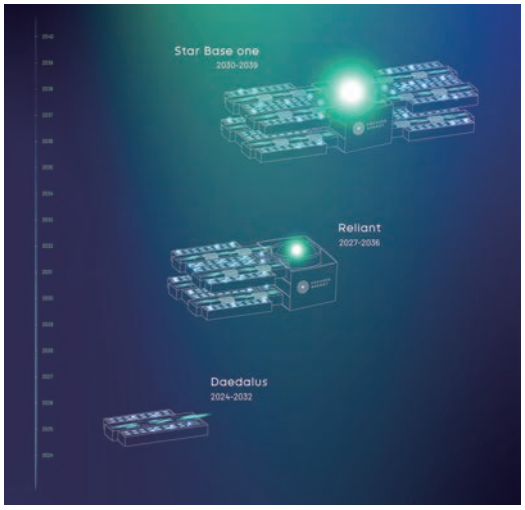
The biggest advantage of laser fusion is the separation of driver and reactor. Where (MCF) has one complex machine, where all components are exposed to the intense radiation, the IFE approach has its main components (the lasers) in a separate building far off the harmful reactor environment. This not only allows for manual maintenance in operation, but also opens the possibility in the choice of materials for the reactor. The reactor itself is much simpler compared to MCF, such that a lot of challenges that have plagued MCF for years simply do not matter in IFE.

Finally, the laser approach allows for a modular, step wise pathway to fusion energy. Laser systems can be added over time, increasing the performance of sub-scale facilities. Consequently, FE starts with a small laser system early on to address important physics questions at an early stage. A first facility is then followed by a sub-scale implosion facility where, without igniting a target, all technology components can be developed to the required technology readiness level (TRL) to be assembled in a first of a kind fusion power plant. The driving laser systems, the target technology, and the diagnostics systems can thereby be moved into the next level facility each time, saving valuable cost and time.

Focused Energy has submitted this concept and a roadmap to both the US and German government. Focused Energy has been selected in the US milestone-based program for fusion energy as one of two laser fusion companies to be funded. In Germany FE is acknowledged and funded by federal and state government to explore the pathway to fusion energy.

As a startup company, Focused Energy is closely collaborating with the science community on the university and national laboratory level and has become a strategic partner to the LLNL fusion hub IFE STARFIRE.

It is the goal of FE to combine the decades of expertise in the field with the speed of a private startup company to speed up the research onto a first laser-driven fusion power plant.



Staged approach with modular facilities, starting from a basic research facility to a sub-scale implosion facility to the first demonstration of a laser-driven power plant.

Markus Roth, Ph.D. is a professor of laser and plasma physics at the university of technology (TUDa) of Darmstadt, Germany. For more than 25 years he has been spearheading particle acceleration by ultra-intense lasers. He started working on laser fusion in 1999 as a scientist at LLNL and since worked on most of the large laser facilities around the world. He has become a fellow of the APS for his contributions to particle acceleration and laser-driven neutron sources, has been an honorary Professor at University of Kyoto (Mitsuyuki Abe chair) for a couple of years, and has been a consultant to national laboratories in the US, UK, and Europe.

NOTE

OPIC 2024

Specialized International Conferences

Conference Chairs' Welcome Letters & Committees

The 13th Advanced Lasers and Photon Sources Conference ALPS 2024

Sponsored by
The Laser Society of Japan

Conference Co-Chair
Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications, Japan

Conference Co-Chair
Ruxin Li
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

We are delighted to welcome you to the 13th Advanced Lasers and Photon Sources Conference (ALPS 2024).

The ALPS conference covers science and technology related to lasers and photon sources, spanning fundamental research and industrial applications. As widely recognized, the development of exceptional light sources is pivotal for advancing new scientific discoveries and applications. At the ALPS conference, participants have a valuable opportunity to exchange ideas and information concerning recent technological advancements and potential new applications. This exchange has been instrumental in maintaining the conference's appeal over the past therteen years.

The ALPS conference is organized as part of the OPTICS & PHOTONICS International Congress (OPIC 2024), which consists of thirteen optics-related scientific conferences. In the 13th ALPS we will have more than 210 excellent presentations to cover the recent advanced in this scientific field including 36 invited talks. The field included are novel optical materials, high average power lasers, high peak power lasers, novel solid-state, fiber, diode lasers, shorter wavelength light sources, terahertz devices, novel optical devices, optical frequency combs, quantum optics, and their applications.

After the relaxation of Covid-19 restrictions, we plan to organize the meeting in a face-to-face format. We anticipate fruitful discussions at the 13th ALPS meeting for all participants. You are cordially invited to join us and enjoy your time at the ALPS conference.

Business and Finance in Sustainable Society 2024 -towards the expansion of photonics industry– BFSS 2024

Sponsored & Organized by
The Graduate School for the Creation of New Photonics Industries (GPI)
In corporation with
CAPITAL MARKET & WOMEN LAB (CAPW)

Conference Chair **Rie H. Kang**

The Graduate School for the Creation of New Photonics Industries, Japan

The aim of the conference is to integrate "Optics & Photonics technology with business" and "Optics & Photonics technology with finance". In recent years, participants in financial capital markets have moved closer to the field of science and technology more than ever before because of the movement towards sustainable finance, including ESG and impact investment. However, universities and other research institutions with various technologies and university-launched start-ups and ventures have few opportunities to be aware of these financial capital markets. To accelerate the social implementation and commercialization of university seeds, contact points with private business, and especially with the financial and capital markets that supply risk money, are indispensable.

Figure: adaption by Kang based on "The SDGs wedding cake" from Stockholm Resilience Centre, Stockholm University (2016).

Sustainable finance points out that the three aspects of sustainable development- economic, social, environmental- interact and it is important to choose the right combination. Sustainable finance can be likened to the three stages of the 'SDGs wedding cake'. As we all know, 'Optics & Photonics' technology is contributing to the resolution of issues related to society and biosphere, as indicated in this figure. It is economic activities that link technologies such as energy, biotechnology, laser processing and optical measurement to social implementation and commercialization to create economic value. And it is SDGs No 17 'Partnership for the Goals' that organically links these activities. The Purpose of the BFSS is to realize this partnership.

Through this conference, we hope to explore new possibilities for 'Optics & Photonics' towards the realization of a sustainable society by bringing together researchers, practitioners and financial and capital market players for exchange of views.

The 10th Biomedical Imaging and Sensing Conference BISC 2024

Sponsored by
SPIE.

Conference Co-Chair
Osamu Matoba
Kobe University, Japan

Conference Co-Chair
Yasuhiro Awatsuji
Kyoto Institute of Technology, Japan

Conference Co-Chair
Yuan Luo
National Taiwan University, Taiwan

Conference Co-Chair
Izumi Nishidate
Tokyo University of Agriculture and Technology, Japan

On behalf of the Organizing and Program Committees, we are delighted that the 10th Biomedical Imaging and Sensing Conference will be held as part of the OPTICS & PHOTONICS International Congress (OPIC 2024).

In biomedical optics and photonics, optical tools are used to understand and treatment of disease, from the cellular level to clinical applications. At the cellular level, high-precision laser applications allow the manipulation, operation or stimulation of cells, even in living organisms or animals by using fluorescent protein and optogenetics. Optical microscopy has been revolutionized by the development of a wide variety of fluorescent dye probes and methods to control their excitation and fluorescence behavior. Various label-free imaging techniques, such as multiphoton microscopy, second- and third-harmonic generation methods, and Raman microscopy, are spreading into many biological and clinical applications. Optical coherence tomography continues to expand its clinical and preclinical applications with higher resolution, faster speed, further miniaturization, and the creation of novel approaches that enable imaging of functional information and tissue dynamics.

Biomedical imaging and sensing are the most rapidly advancing and expanding areas in optics and photonics. Techniques developed in these areas could bring us great advances in physical, engineering and biological knowledge as well as in optics and photonics technology. The aim of this conference is to cover several aspects, from the fundamental studies at the cellular level to the clinical applications of various optical technologies.

Finally, we hope that the 10th Biomedical Imaging and Sensing Conference will contribute to the progress in this field and wish you fruitful discussions.

International Conference on High Energy Density Science 2024 HEDS 2024

Sponsored by
Institute of Laser Engineering, Osaka University

Conference Co-Chair
Ryosuke Kodama
Osaka University, Japan

Conference Co-Chair
Takayoshi Sano
Osaka University, Japan

We are delighted that you have joined the 12th International Conference on High Energy Density Science (HEDS) within the framework of OPTICS & PHOTONICS International Congress (OPIC).

HEDS covers the high energy density sciences with high-power lasers and their applications. The Primary topic of HEDS 2024 is "Particle Acceleration in Laboratory and Astrophysical Plasmas; Shock, Turbulence, and Magnetic Reconnection". Particle acceleration is a physical process common to both laboratory and astronomical plasmas. The origin of high-energy cosmic rays is one of the critical issues in astrophysics and has been investigated intensively using numerical simulations. Particle acceleration has also been studied experimentally using such as intense laser experiments.

HEDS 2024 invites scientists worldwide in the fields of "Particle Acceleration in Laboratory and Astrophysical Plasmas," including experimental and theoretical/numerical works.

We want to promote interdisciplinary discussions by gathering knowledge on particle acceleration physics in various fields to stimulate each other and foster friendships for future collaborations.

HEDS 2024 is co-sponsored by the Institute of Laser Engineering, Osaka University. We hope you enjoy the conference, which is held in person at Yokohama.

International Conference on Nano-photonics and Nano-optoelectronics 2024 ICNN 2024

Sponsored by
Institute for Nano Quantum Information Electronics, The University of Tokyo

Conference Chair **Yasuhiko Arakawa**
The University of Tokyo

We warmly welcome you to the International Conference on Nano-photonics and Nano-optoelectronics (ICNN 2024). The development of nanoscale devices is an area of research making great strides in both academic and industrial laboratories around the world. ICNN has been organized for the purpose of bringing together likeminded researchers working in the areas of nano-photonics and nano-optoelectronics, and to provide ample opportunities for peer interaction, inspiring presentations, exciting discussions, and invigorating debates. We are pleased to organize ICNN 2024 as one of the international scientific meetings of the Optics & Photonics International Congress 2024 (OPIC 2024).

The two and a half-day program of ICNN 2024 consists of oral sessions and poster session with 3 keynote talks, 10 invited talks, oral contributed talks, and poster presentations. In ICNN 2024, recent advances in nano-photonics and nano-optoelectronics will be featured by our 13 distinguished keynote and invited scientists; Stephan Reitzenstein (Germany), Takao Aoki (Japan), Yidong Huang (China), Xu Fang (UK), Shun Fujii (Japan), Miyabi Imai-Imada (Japan), Kentaro Iwami (Japan), Yuichiro Kato (Japan), Kyoko Kitamura (Japan), Rai Kou (Japan), Yu-Jung Lu (Taiwan), Otto Muskens (UK), Winnie Ye (Canada).

As the General Chair of ICNN 2024, I would like to express my sincere gratitude to all the oral speakers and poster presenters to discuss their technical achievements. Moreover, I thank all the conference committee members for their great contribution to the success of ICNN 2024, in particular, the program committee members for their critical reviewing of submitted papers.

We wish that all the participants enjoy fascinating presentations and discussion at ICNN 2024.

Organizing Committee

Chair:
Yasuhiko Arakawa (The University of Tokyo)
Vice-Chair:
Susumu Noda (Kyoto University)
Secretaries:
Takashi Asano (Kyoto University)
Mark Holmes (Apple Inc.)
Jun Tatebayashi (Osaka University)
Members:
Toshihiko Baba (Yokohama National University)
Yasufumi Fujiwara (Osaka University)
Yoichi Kawakami (Kyoto University)
Takashi Kita (Kobe University)
Takahiro Nakamura (AIOCORE)
Takuo Tanaka (RIKEN)

Program Committee

Chairs:
Shinji Matsuo (NTT)
Toshiharu Saiki (Keio University)
Vice Chairs:
Satoshi Iwamoto (The University of Tokyo)
Takasumi Tanabe (Keio University)
Secretaries:
Yasutomo Ota (Keio University)
Wakana Kubo (Tokyo University of Agriculture and Technology)
Members:
Connie Chang-Hasnain (University of California, Berkeley)
Xu Fang (Southampton University)
Jonathan Finley (Technical University of Munich)
Tamitake Itoh (National Institute of Advanced Industrial Science and Technology)
Yuichiro Kato (RIKEN)
Tomohiro Kita (Waseda University)
Christian Koos (Karlsruhe Institute of Technology)
Jian-Feng Li (Xiamen University)
Yu-Jung Lu (Academia Sinica)
Sile Nic Chormaic (Okinawa Institute of Science and Technology)
Koichi Okamoto (Osaka Prefecture University)
Rupert Oulton (Imperial College London)
Robert E. Simpson (Singapore University of Technology and Design)
Junichi Takahara (Osaka University)
Takuo Tanemura (The University of Tokyo)
Dries Van Thourhout (Ghent University)
Din Ping Tsai (National Taiwan University)
Anatoly Zayats (King's College London)

Information Photonics 2024
IP 2024

Sponsored by
The Optical Society of Japan

Conference Co-Chair
Yoshio Hayasaki
Utsunomiya University, Japan

Conference Co-Chair
Stephan Reichelt
University of Stuttgart, Germany

Conference Co-Chair
Jae-Hyeung Park
Inha University, Korea

We are delighted that Information Photonics (IP) organized by the Optical Society of Japan (OSJ) is going to hold successfully in OPIC 2024 at Yokohama. The IP meeting started at Aspen, Colorado in 1999 as the succeeding meeting of Optics in Computing (OC) organized by Optical Society of America (OSA). The subsequent IP meetings were held at Lake Tahoe, Nevada, in 2001, Washington, D.C. in 2003, and Charlotte, North Carolina in 2005. After those, the IP meeting was held at Awaji, Japan in 2008 organized by the Group of Information Photonics of OSJ, Ottawa in 2011, Warsaw in 2013, Yokohama in 2017, 2019, and 2022 as one of the conferences in OPIC, and Taipei in 2020 and 2023. Information photonics is an emerging field that includes state-of-the-art methods, devices, models, and applications related to the utilization of optics in information society. We hope that scientists, researchers, engineers, and students enjoy discussing recent developments in the field of information photonics.

Steering committee
<Chairs>
Yusuke Ogura *Osaka Univ., Japan*
Hiroyuki Suzuki *Gunma Univ., Japan*
<Members>
Naoya Tate *Kyushu Univ., Japan*
Suguru Shimomura *Osaka Univ., Japan*
Saori Takeyama *Tokyo Inst. Tech., Japan*
Peng Xia *AIST, Japan*
Shuji Taue *Kochi Inst. Tech., Japan*
Yusuke Saita *Wakayama Univ., Japan*

International Advisory Committee
<Chair>
Jun Tanida *Osaka Univ., Japan*
<Members>
Toyohiko Yatagai *Utsunomiya Univ., Japan*
Mistuo Takeda *Utsunomiya Univ., Japan*
Kashiko Kodate *Univ. of Electro-Communications, Japan Women's Univ., Japan*
Nam Kim *Chungbuk National Univ., Korea*
Ken Y. Hsu *National Chiao Tung Univ., Taiwan*
Malgorzata Kujawinska *Warsaw Univ. of Technology, Poland*
Wolfgang Osten *Univ. of Stuttgart, Germany*
Ting-Chung Poon *Virginia Tech., USA*
Bahram Javidi *Univ. of Connecticut, USA*
Kelvin Wagner *Univ. of Colorado, USA*
Nobuyuki Hashimoto *Citizen, Japan*
Haruyoshi Toyoda *Hamamatsu Photonics, Japan*
Takanori Nomura *Wakayama Univ., Japan*
Masahiro Yamaguchi *Tokyo Inst. Tech., Japan*
Osamu Matoba *Kobe Univ., Japan*
Yasuhiro Awatsuji *Kyoto Inst. Tech., Japan*

Program committee
<Chairs>
Yasuhiro Mizutani *Osaka Univ., Japan*
Koichi Nitta *Kobe Univ., Japan*
Jung-Ping Liu *Feng Chia Univ., Taiwan*
Enrique Tajahuerce *Univ. Jaume I, Spain*
<Members>
Pascal Picart *Lemans Univ., France*
Chau-Jern Cheng *National Taiwan Normal Univ., Taiwan*
Ching-Cherng Sun *National Central Univ., Taiwan*
Shiuan Huei Lin *National Chiao Tung Univ., Taiwan*
Tomasz Kozacki *Politechnika Warszawska, Poland*
Wojciech Krauze *Warsaw Univ. of Tech., Poland*
Guohai Situ *Shanghai Institute of Optics and Fine Mechanics, China*
Xiaodi Tan *Fujian Normal Univ., China*
Liangcai Cao *Tsinghua Univ., China*
Percival Almoro *Univ. of the Philippines, Philippines*
Wei-Hung Su *National Sun Yet-Sen Univ., Taiwan*
Yuan Luo *National Taiwan Univ., Taiwan*
Prathan Buranasiri *King Mongkut's Inst. of Tech. Ladkrabang, Thailand*
Pham Duc Quang *Vietnam National University Hanoi, Vietnam*
Hee-Jin Choi *Sejong Univ., Korea*
Hirotsugu Yamamoto *Utsunomiya Univ., Japan*
Ayano Tanabe *Citizen Ho. Co., Ltd., Japan*
Hiroshi Tanaka *Hamamatsu Photonics, Japan*
Yoshinori Akao *National Research Inst. of Police Science, Japan*
Kenji Harada *Kitami Inst. of Tech., Japan*
Eriko Watanabe *Univ. of Electro-Communications, Japan*
Nobukazu Yoshikawa *Tottori Univ., Japan*
Tomoya Nakamura *Osaka Univ., Japan*
Kazuya Nakano *Seikei Univ., Japan*
Takashi Kakue *Chiba Univ., Japan*
Masayuki Yokota *Shimane Univ., Japan*
Kota Kumagai *Utsunomiya Univ., Japan*
Takashi Nishituji *Toho Univ., Japan*
Shuhei Yoshida *Kindai Univ., Japan*
Teruyoshi Nobukawa *Nippon Hoso Kyokai, Japan*
Yusuke Sando *Osaka Research Institute of Industrial Science and Technology, Japan*
Kanami Ikeda *Osaka Metropolitan Univ., Japan*
Yutaka Endo *Kanazawa Univ., Japan*
Haruki Mizushina *Tokushima Univ., Japan*

Laser Display and Lighting Conference 2024
LDC 2024

Sponsored by
The Optical Society of Japan

Honorary Chair
Kazuo Kuroda
The University of Tokyo, Japan

Conference Co-Chair
Hiroshi Murata
Mie University, Japan

Conference Co-Chair
Fergal Shevlin
DYOPTYKA, Ireland

Welcome to the 13th Laser Display and Lighting Conference, LDC 2024!

LDC is an international conference on laser displays, laser lighting, and related technologies. The 1st LDC was held in Yokohama, Japan in 2012. After that, LDCs were held in Yokohama, Japan (2013, 2015, 2017~2019), in Taichung, Taiwan (2014), and in Jena, Germany (2016). The 9th and 10th LDC were intended to be held in Yokohama, Japan, but switched to be on-line conferences owing to the COVID-19 situation. The 11th LDC was held as a hybrid on-line and in-person conference in 2022. The 12th LDC was held in Yokohama in-person. Then, LDC 2024 is also being held as an in-person conference in Yokohama from 23rd to 26th April 2024. LDC 2024 is sponsored by the Optical Society of Japan, in cooperation with several academic societies and associations, and is operated by the Laser Display Research Group, the Optical Society of Japan.

LDC 2024 is intended to provide a central forum for the update and review of scientific and technical information on laser display and lighting covering a wide range of fields from fundamental research to systems and applications.

A total of 40 papers will be presented during the 4-day conference, consisting of 2 keynote talks, 22 invited papers, and 16 contributed papers. Several papers will be also presented as posters. It is notable that number of submissions is almost the same with before and during the COVID-19 pandemic, which is due to the kind interest and great support from the LDC community to recover from the difficult situation caused by COVID-19. A few post-deadline papers may be accepted.

In LDC 2024, a special session focusing on advanced XR and Metaverse technologies will be held on the 24th, where we will have stimulating invited talks from expert speakers. An exciting special session entitled 'Laser Applications for Moving Platforms' will also be held with a number of distinguished speakers on 26th April. In these special sessions, state-of-the-art visible laser technology for XR, Metaverse and moving target applications, will be presented, and discussed. After all the technical sessions, a ceremony for the LDC Best Paper Award and the LDC Student Award will be held for exceptional papers commended for their outstanding achievement.

We would like to extend our sincere thanks to all the presenters and participants of LDC 2024 for their contribution to the success of the conference. We also express our sincere thanks to the Takano-Eiichi Hikari-Kagaku-Kikin (Optical Science Foundation), the Japanese Society of Applied Physics, for the financial support. We hope that all the attendees enjoy the conference.

HONORARY CHAIR
Kazuo Kuroda *Utsunomiya Univ.*

CONFERENCE CHAIR
<Co-Chairs>
Hiroshi Murata *Mie Univ.*
Fergal Shevlin *DYOPTYKA*

STEERING COMMITTEE
<Co-Chairs>
Kazuhisa Yamamoto *Osaka Univ.*
Norihiro Ohse *Sony Group Corp.*
<Members>
Makio Kurashige *Dai Nippon Printing*
Atsushi Motogaito *Mie Univ.*
Fumio Narusawa *HIOKI E.E. Corp.*
Keizo Ochi *Consortium of Visible Laser Diode Applications*
Kayo Ogawa *Japan Women's Univ.*
Shouichi Ozawa *Nikka Joho*
Shinji Saito *Toshiba Corp.*
Ichiro Sato *Bosch Corp.*
Tsutomu Shimura *Univ. of Tokyo*
Naoto Jikutani *Ricoh Industrial Solutions*
Takunori Taira *National Inst. of Natural Science*
Masashi Wada *Gooch & Housego Japan*

PROGRAM COMMITTEE
<Co-Chairs>
Sunao Kurimura *National Inst. for Materials Science*
Tetsuya Yagi *Nichia Corp.*
Shining Zhu *Nanjing Univ.*
<Vice Co-Chairs>
Hirotsugu Yamamoto *Utsunomiya University*
Kenji Yamamoto *Tokushima Univ.*
Tatsushi Hamaguchi *Mie Univ..*
Muneharu Kuwata *Mitsubishi Electric Corp.*
<Members>
Abdelmalek Hanafi *BMW, Forschungs- und Innovationszentrum*
Atsushi Satou *Iwasaki Electric*
Eiji Hase *Tokushima University*
Frank Fischer *BST*
Hidekazu Hatanaka *Ushio*
Junichi Kinoshita *Osaka Univ.*
Katsuyuki Kambe *Solidray*
Lung-Han Peng *National Taiwan Univ.*
Masafumi Ide *Lamda Works*
Masaru Kuramoto *Stanley Electronics*
Masato Ishino *Osaka Univ.*
Osamu Matoba *Kobe University*
Ray-Hua Horng *National Yang Ming Chiao Tung University*
Satoshi Ouchi *Hitachi Corp.*
Seika Tokumitsu *Oxide*
Shining Zhu *Nanjing University*
Tetsuo Shimizu *Epson*
Takaaki Ishigure *Keio Univ.*
Tomoyuki Miyamoto *Tokyo Inst. Tech.*
Yasuaki Kumamoto *Osaka University*
Young-Joo Kim *Yonsei University*

ADVISORY MEMBERS
Ray-Hua Horng *National Chung Hsing Univ.*
Yasuhiro Koike *Keio Univ.*
Shigeo Kubota *Oxide Corp.*
Takashige Omatsu *Chiba Univ.*
Brian Schowengerdt *Univ. of Washington*
Hiroaki Sugiura *Mitsubishi Electric Corp.*
Toshiaki Suhara *Osaka Univ.*
Andreas Tünnermann *Fraunhofer Institute, IOF*

The 10th International Conference on Light-Emitting Devices and Their Industrial Applications LEDIA 2024

Conference Chair **Hiroshi Amano**

Nagoya University, Japan

Welcome to the 10th International Conference on Light-Emitting Devices and Their Industrial Applications (LEDIA 2024), which is one of the specialized international conferences in OPTICS and PHOTONICS International Congress 2024 (OPIC 2024).

Since 2013, LEDIA has been designed to provide a platform for active scientists and engineers to present and discuss progress and future trends in science and technology challenges of growths, fabrications, and characterizations of light emitting diodes/laser diodes, and their industrial applications. The scope of LEDIA 2024 covers the following topical fields; 1. Light-Emitting Diodes, 2. Laser Diodes, 3. Photodetectors and Solar Cells, 4. Epitaxial Growths, 5. Extended Wavelength Devices, 6. Novel Fabrication Processes, 7. Novel Characterization Methods, 8. Novel Materials and Devices, and 9. Industrial Application. Attendances will be able to receive a lot of information through discussions with speakers including invited ones. We also would like to emphasize that another aspect of LEDIA is to encourage students and young researchers to attend the conference, and to inspire their creativity through the discussions. We hope that all the attendees will enjoy the conference and will be satisfied with the discussions in LEDIA 2024.

Conference on Laser and Synchrotron Radiation Combination Experiment 2024 LSC 2024

Sponsored by
Institute of Laser Engineering, Osaka University

Conference Chair **Toshihiko Shimizu**

Institute of Laser Engineering, Osaka University, Japan

We are pleased to welcome you to the Conference on Laser and Synchrotron Radiation Combination Experiment (LSC) 2024.

As part of the OPTICS & PHOTONICS International Congress (OPIC), LSC aims to converge all scientists and engineers who are working on laser and synchrotron experiments all over the world.

The conference features invited talks and presentations on the recent developments, activities, and trends in lasers and synchrotron sources, instrumentation, experimental techniques, and applications. Especially we will focus on the rapid development of new experimental techniques such as ultrashort pulse lasers and X-ray free electron lasers, which made the study of sub-picosecond dynamics more accessible. A breakthrough, which has not been possible just by studying static properties of materials, is expected to occur by studying sub-picosecond dynamics. Given the current state of this research field, cooperation between laser and synchrotron is getting more and more important. In recent years, interdisciplinary research, in which lasers and synchrotron radiation are applied to fields with which they have had little involvement, has become possible, and we expect that more and more researchers will participate in this area in the future, expanding the community.

We are very pleased that the conference has become a hybrid online event, attracting a larger and more diverse audience. We hope that you will find all the LSC and OPIC activities interesting, engaging, and beneficial. We are very grateful for your participation, and we hope you will have great time at the conference.

Laser Solutions for Space and the Earth 2024
LSSE 2024

Sponsored by
The Executive Committee of Laser Solutions for Space and the Earth

Conference Chair **Satoshi Wada**

RIKEN Center for Advanced Photonics, Photonics Control Technology Team, Team Leader

The aim of "Laser Solutions for Space and the Earth (LSSE)" is to discuss the application of emerging laser and optical technologies to solve various problems for sustainable developments of space and the earth.

The featured topics in LSSE 2024 are "Carbon Neutral", "Agri-Photonics", "Space Technology", "Remote Sensing", "Infrastructures" and "Industrial Application". We have one keynote lecture, many invited and oral presentations.

LSSE 2024 will be held at Pacifico Yokohama Japan and on-line.

LSSE 2024 is collaborated with OPIC 2024 (Optics & Photonics international Congress 2024). OPIC is the largest conference in OPTICS and PHOTONICS in Japan with more than 10 conferences in addition to LSSE. You can also participate in OPIC 2024 by participating in LSSE 2024.

We are looking forward to seeing you all in Yokohama!

The 11th Optical Manipulation and Structured Materials Conference OMC 2024

Sponsored by
SPIE.

Conference Co-Chair
Takashige Omatsu
Chiba University, Japan

Conference Co-Chair
Kishan Dholakia
University of St. Andrews, UK

Conference Co-Chair
Sile Nic Chormaic
Okinawa Institute of Science and Technology Graduate University, Japan

Since the first demonstration of an optical tweezer based on optical radiation forces (scattering and gradient forces) created by a tightly focused laser beam, optical tweezers have been widely investigated in a variety of research fields, including biology, physics, and chemistry. In fact, Dr. A. Ashkin was awarded Nobel Prize in Physics, for contributing to a pioneering work of optical manipulation, 2018.

Conventional optical tweezers have been mostly adopted to dielectric particles with a dimension range from hundreds of nanometers to tens of micrometers. However, they do not always enable us to efficiently trap metallic particles.

In recent years, plasmonic tweezers based on enhanced radiation forces owing to surface plasmon polaritons in metallic nanostructures have been successfully demonstrated to efficiently trap and manipulate both nanosacle-sized dielectric and metallic particles.

Also, structured lights, such as higher order Laguerre-Gaussian and Bessel beams carry orbital angular momentum, and they provide unique tweezing abilities, for instance, for inducing an orbital motion of the trapped particles without employing mechanical systems.

Since 2014, the OMC has successfully collected more than 80 participants from home and abroad, and it marked its 10th anniversary last year! The OMC 2024 conference aims to present and discuss up-to-date scientific subjects, new technologies, and applications related to the fields of optical and plasmonic tweezers, the manipulation of nanostructures, structured optical fields and their satellite topics.

We hope that this conference will also facilitate scientific and professional networking as well as scientific inspiration through discussions.

Conference Co-Chairs

Takashige Omatsu *Chiba University, Japan*
Kishan Dholakia *The University Australia University of St. Andrews, UK*
Sile Nic Chormaic *Okinawa Institute of Science and Technology Graduate University, Japan*

Program Committee

Masaaki Ashida *Osaka University*
Satoshi Ashihara *The University of Tokyo*
Kyoko Kitamura *Kyoto Institute of Technology*
Ryuji Morita *Hokkaido University*
Seigo Ohno *Tohoku University*
Ichiro Shoji *Chuo University*
Kyunghwan Oh *Yonsei University*
Yasuyuki Kimura *Kyusyu University*
Kyoko Namura *Kyoto University*
Yung-Fu Chen *National Chiao Tung University, Taiwan*
Yuichi Kozawa *Tohoku University*
Yoko Miyamoto *The University of Electro-Communications, Japan*
Hiromi Okamoto *Institute for Molecular Science, Japan*
Yauhiro Sugawara *Osaka University, Japan*
Xiaodi Tan *Fujian Normal University, China*
Yasuyuki Tsuboi *Osaka City University, Japan*
Nirmal Viswanathan *University of Hyderabad, India*

Optical Technology and Measurement for Industrial Applications 2024 OPTM 2024

Co-Sponsored by
SPIE, Technical Committee for Mechano-Photonics, The Japan Society for Precision Engineering

Conference Co-Chair
Rainer Tutsch

Technische Universität Braunschweig

Conference Co-Chair
Toru Yoshizawa

Tokyo University of Agriculture and Technology, Prof. Emeritus
Non-Profit Organization: 3D Associates, Director

Conference Co-Chair
Yukitoshi Otani

Utsunomiya University

On May 8, 2023, the status of novel coronavirus infections was changed from category 2 to category 5. As a result, we are planning a full-fledged, in-person format meeting, to be held as we had last year.

The aim of OPTM 2024 is to provide an international opportunity for introducing up-to-date technology in the field of optical measurement and its applications for industries. At the same time, providing a networking opportunity among young researchers and students is another important role of the conference. At the same venue, other optics-related exhibitions and conferences will also be held, providing a good chance to foster interest in different technical fields. We hope your visit to the port of Yokohama will be a nice experience in your technical and research career.

The 6th Optical Wireless and Fiber Power Transmission Conference OWPT 2024

Sponsored by
The Laser Society of Japan
Study Group of Optical Wireless Power Transmission

Conference Chair
Tomoyuki Miyamoto
Tokyo Institute of Technology, Japan

Conference Chair
Motoharu Matsuura
The University of Electro-Communications, Japan

It is our great honor to welcome you to the 6th Optical Wireless and Fiber Power Transmission Conference (OWPT 2024). OWPT 2024 will be held as an online/on-site hybrid conference. The venue will be in Yokohama, Japan.

OWPT 2024 is an international conference intended to provide a central forum for updating and reviewing scientific and technical information on optical wireless power transmission and optical fiber power transmission, covering a wide range of areas from fundamental research to systems and applications. OWPT 2024 is organized as part of the OPTICS & PHOTONICS International Congress (OPIC 2024), which consists of 16 optics and photonics related scientific conferences. OWPT 2024 is sponsored by the Optical Wireless Power Transmission Committee of the Laser Society of Japan in cooperation with the Study Group of Optical Wireless Power Transmission in Japan. OWPT 2024 consists of 1 plenary talk, 1 special talk, 8 invited talks, and more than 30 contributed papers aiming at great developments in the field covering novel materials/devices and components, systems and subsystems, applications, and related topics.

Please join the community and get the latest activities and achievements of the scope of OWPT 2024.

The 5th Smart Laser Processing Conference SLPC 2024

Organized by
Japan Laser Processing Society (JLPS)
Joining and Welding Research Institute (JWRI) Osaka University, Japan
OPI Council, Japan

Conference Chair
Masahiro Tsukamoto
JWRI, Osaka University, Japan

Conference Co-Chair
Andreas Ostendorf
Applied Laser Technologies, Ruhr University Bochum, Germany

On behalf of the organizing committee, it is our great pleasure to welcome you to SLPC 2024 The 5th Smart Laser Processing Conference. Since 2014, the past SLPC conferences were launched with generous supports from many scientists and engineers in the fields of laser materials processing. Except SLPC 2020 which was cancelled due to the COVID-19, SLPC conferences were the great successes with the fine scientists and engineers attending. And now, the 5th SLPC conference is held at PACIFICO Yokohama again to encourage rapid development of laser processing technologies.

SLPC 2024 deals with science and technology of smart laser materials processing including micro- and macro-processing. SLPC 2024 aims at providing a forum for discussion of fundamental aspects of laser-matter interaction, and the state-of -the-art of smart laser materials processing, in addition to fostering next generation concepts and innovation by collaboration among participants including scientists, end users and laser manufacturers. We wish smart laser materials processing technologies would spread all over the world through this conference. SLPC 2024 is the 3-day event which consists of a plenary session, regular oral sessions, and poster session, collaborating with other 15 professional conferences in OPIC 2024 Optics & Photonics International Congress 2024. The conference site, Yokohama, is one of the famous port towns in Japan, and many technologies had been spread all in Japan through here.

We would like to express our sincere thanks to all the presenters, in particular the plenary and the invited speakers, cooperating societies, media partners, and our sponsors. We would also like to thank the chairs and the members of program committee, steering committee, international advisory committee, and the secretariat. Thank you very much for attending, and we sincerely hope you enjoy your time at the good season of fresh green leaves in Yokohama.

General Chair
Masahiro Tsukamoto *JWRI, Osaka University, Japan*

Co-Chair
Andeas Ostendorf *Applied Laser Technologies, Ruhr University Bochum, Germany*

International advisory committee
<Members>
Christian Hagenlocher *Institut für Strahlwerkzeuge (IFSW), Germany*
Yongfeng Lu *University of Nebraska Lincoln, USA*
Beat Neuenschwander *Bern University of Applied Sciences, Institute for Applied Laser, Photonics and Surface Technologies ALPS, Switzerland*
Patcharapit Promoppatum *King Mongkut's University of Technology Thonburi, Thailand*
Gediminas Račiukaitis *Head of Department of Laser Technologies FTMC - Center for Physical Sciences and Technology, Lithuania*
Tomokazu Sano *Osaka University, Japan*

Program commitee
<Chair>
Masahito Katto *University of Miyazaki, Japan*
<Co-Chairs>
Hitoshi Nakano *Kindai University, Japan*
Aiko Narazaki *National Institute of Advanced Industrial Science and Technology (AIST), Japan*
<Members>
Masaki Hashida *Tokai University, Japan*
Yoshio Hayasaki *Utsunomiya University, Japan*
Souta Matsusaka *Chiba University, Japan*
Godai Miyaji *Tokyo University of Agriculture and Technology, Japan*
Mizue Mizoshiri *Nagaoka University of Technology, Japan*
Yasuhiro Okamoto *Okayama University, Japan*
Timotius Pasang *Western Michigan Universtity, USA*
Keisuke Shigemori *Osaka University, Japan*
Sasitorn Srisawadi *National Metal and Materials Technology Center (MTEC), Thailand*
Rie Tanabe *Fukuoka Institute of Technology, Japan*
Miho Tsuyama *Kindai University, Japan*
Jörg Volpp *Luleå University of Technology, Department of Engineering Sciences and Mathematics, Sweden*
Yorihiro Yamashita *University of Fukui, Japan*

Steering committee
<Chair>
Yuji Sato *JWRI, Osaka University, Japan*
<Members>
Keisuke Takenaka *JWRI, Osaka University, Japan*
Kyohei Maeda *Kobe Steel, Ltd, Japan*

Tiny Integrated Laser and Laser Ignition Conference 2024 TILA-LIC 2024

Sponsored by
Micro Solid-State Photonics Association

Conference Chair **Takunori Taira**

RIKEN SPring-8 Center (RSC) / Institute for Molecular Science (IMS)

Welcome to the 10th Tiny Integrated Laser and Laser Ignition Conference 2024 (TILA-LIC 2024), which is the international forum for discussions on various aspects of the ubiquitous sources and phenomena associated with highly intense laser pulses. TILA-LIC offers to share information on sciences and technologies related to Giant Micro-photonics. "Tiny Integrated Laser (TILA)" means the compact integration of highly intense laser devices and peripheral systems that enables ubiquitous operation of extraordinarily accurate measurements and control of extreme material phases. Here, the word "laser ignition (LI)" originally means the laser induced breakdown ignition, and it also implies the induction of phenomena caused by the irradiation of high-brightness laser pulses until the TILA based material processing, laser driven particle acceleration and the other intense laser applications. Based on the recent photonic innovation called by Giant Micro-photonics, ubiquitous lasers symbolized by TILA that can be operated at everywhere and anytime by everybody can become the door to promote the world to a new generation. The conference will be held at Pacifico Yokohama, Yokohama, Japan, on April 24-26, 2024 with the sponsorship from Laser-Driven Electron-Acceleration Technology Group, RIKEN SPring-8 Center, and Division of Research Innovation and Collaboration, Institute for Molecular Science in cooperation with several academic societies and associations.

After TILA-LIC opening talks, a total of 42+ papers will be presented, consisting of one Keynote, one Tutorial, two Plenary, 12 Invited papers, and 26 Contributed papers. In addition, we organize 4 introduction talks with regarding the TILA related company activity. At the closing remarks, award ceremony will be held at which several papers will be commended for their outstanding achievement. We would like to extend our thanks to all the presenters and participants of TILA-LIC 2024 for their contribution to the success of the conference. We also express our thanks to the endorsement and sponsor groups.

International Conference on X-ray Optics and Applications 2024
XOPT 2024

Co-Sponsored by
RIKEN SPring-8 Center
Research Center for Precision Engineering, Osaka University
Technical Committee for Ultraprecision Machining of JSPE

Conference Co-Chair
Tetsuya Ishikawa
RIKEN, Japan

Conference Co-Chair
Kazuto Yamauchi
Osaka University, Japan

We are pleased to host the International Conference on X-ray Optics and Applications (XOPT 2024) as part of the Optics and Photonics International Congress 2024 (OPIC 2024).

X-rays have played a vital role in many breakthrough scientific discoveries in recent years. Continuous innovations in X-ray optics, methodologies, and beamline instruments have laid the foundation for these achievements. For this conference, we are inviting leading experts in these fields worldwide to share the latest status of X-ray technology and developments and discuss their plans for the future. One important topic we would like to discuss is how state-of-the-art X-ray optics can explore the potential of emerging DLSR (Diffraction-Limited Synchrotron Radiation) sources.

For details, please visit the XOPT website (https://xopt.opicon.jp/).

We are happy to welcome you to participate in and enjoy the conference.

OPIC 2024 Conferences Program

Oral Sessions

Oral, Monday, 22 April AM

ALPS <Room 303>

[ALPS-OP] 10:30-10:45
Opening Remarks
Chair: Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications

[ALPS1] 10:45-12:00
High peak power lasers, high pulse energy lasers and applications (1)
Chair: Hiromitsu Kiriyama
National Institutes for Quantum and Radiological Science and Technology

ALPS1-01 10:45 *Invited*

Ultra-intense and Ultra-short laser and its applications in SIOM
Yuxin Leng, Yujie Peng, Yi Xu, Lianghong Yu, Hongxiang Lin, Xiaoyan Liang, Ruxin Li
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences
We will report the new progress of the latest progress of the three international user platforms in the Shanghai Super-intense Ultra-fast Laser Facility and the station of the extreme light, which contain a 100PW laser system.

ALPS1-02 11:15 *Invited*

The ZEUS Scientific User Facility at the University of Michigan
Igor Jovanovic, Andre Antoine, Junwoo Bae, Mario Balcazar, Franko Bayer, Milos Burger, Paul Campbell, Jason Cardarelli, Veronica Contreras, Nicholas Ernst, Rebecca Fitzgarrald, Bixue Hou, Galina Kalinchenko, Salee Klein, Karl Krushelnick, Carolyn Kuranz, Joshua Latham, William Likes, Yong Ma, Anatoly Maksimchuk, Andrew McKelvey, John Nees, Tanner Nutting, Elizabeth Oxford, Alexander Thomas, Richard Van Camp, Lauren Weinberg, Louise Willingale, Qing Zhang
University of Michigan
The new dual-beamline 3 PW Zettawatt-Equivalent Ultrashort pulse laser System (ZEUS) is under commissioning. ZEUS features three target areas and recently started experimental operations as a user facility open to the international scientific community.

ALPS <Room 511+512>

[ALPS6] 11:15-12:15
Novel optical materials/structure and applications (1)
Chair: Shohei Kodama
Saitama Univ.

ALPS6-01 11:15 *Invited*

Novel halide materials for scintillation applications
Robert Kral, Katerina Krehlikova, Vojtech Vanecek, Romana Kucerkova, Vladimir Babin, Petra Zemenova, Jan Rohlicek, Martin Nikl
Institute of Physics, Czech Academy of Sciences
Novel halide materials are a relevant material group, which have a potential to meet the recent demands for search of new scintillating materials regarding their performance e.g. light yield, energy resolution, timing, production costs, etc.

ICNN <Room 414+415>

[ICNN-OP] 9:50-10:00
Opening remarks
Chair: Yasuhiko Arakawa
The University of Tokyo

[ICNN1] 10:00-11:45
Keynote
Chair: Shinji Matsuo
NTT

ICNN1-01 10:00 *Keynote*

On-chip Perceptual Technology with New Physical Mechanisms
Yidong Huang, Kaiyu Cui, Jiawei Yang, Ning Wu, Fang Liu, Xue Feng, Wei Zhang
Tsinghua Univ.
New physical mechanisms make possible a revolution in perceptual technology. This report shows the new on-chip perceptual technology based on spectral imaging and phonon lasing.

ICNN1-02 10:35 *Keynote*

Single quantum dot devices for photonic quantum technologies: Design, Deterministic Nanofabrication, and Application Perspectives
Stephan Reitzenstein
Technische Universität Berlin
Quantum dots (QDs) exhibit exceptional quantum optical properties, making them ideal for high-performance photonic quantum devices. This talk reviews the development quantum light sources and integrated quantum circuits based on semiconductor QDs, emphasizing deterministic nanofabrication technologies for scalable integration into photonic structures such as circular Bragg grating cavities and nanobeam cavities coupled to on-chip quantum circuits.

ICNN1-03 11:10 *Keynote*

Nanofiber Cavity Quantum Electrodynamics Systems for Distributed Quantum Computing
Takao Aoki
Waseda University
I will present our experimental research on nanofiber cavity quantum electrodynamics systems and prospects toward distributed quantum computing based on these systems.

Oral, Monday, 22 April AM

ALPS <Room 303>

ALPS1-03 11:45

Technology development for the lambda^3 ultra-intense ultrashort lasers

Zhaoyang Li
Shanghai Institute of Optics and Fine Mechanics

Recent progress in technology development for generating the lambda^3 ultra-intense ultrashort lasers, i.e., compressing all the energy of a laser pulse into a spatiotemporal focal cube edged by the laser centre wavelength, is reported.

----- Lunch 12:00-13:45 -----

ALPS <Room 511+512>

ALPS6-02 11:45

Growth and Luminescence Properties of $Cs_3(Cu, Li)_2I_5$ Scintillators for Neutron and Gamma-ray Dual Monitor

Yusuke Urano[1,2], Shunsuke Kurosawa[2,3,4], Akihiro Yamaji[2,3], Akira Yoshikawa[2,3], Yuntao Wu[5]
[1]Graduate School of Engineering, Tohoku University, [2]Institute for Materials Research (IMR), Tohoku University, [3]New Industry Creation Hatchery Center (NICHe), Tohoku University, [4]Institute of Laser Engineering, Osaka University, [5]Artificial Crystal Research Center Shanghai Institute of Ceramics, Chinese Academy of Sciences (SICCAS)

$Cs_3(Cu, Li)_2I_5$ scintillation crystals were grown for neutron and gamma-ray dual monitoring in Fukushima Daiichi Nuclear Power Plant, and their luminescence and scintillation properties were evaluated.

ALPS6-03 12:00

Pulse-Shaped Discrimination for Organic Scintillation Crystals as Neutron Detection

Shunsuke kurosawa[1,2], Yusuke Urano[1], Akihiro Yamaji[1]
[1]Tohoku University, [2]Osaka University

Pulse-shaped discrimination for the p-Terphenyl and other organic scintillators grown by the Bridgeman technique were evaluated to discriminate gamma rays and neutrons, and p-Terphenyl was found to be well-separated.

----- Lunch 12:15-14:00 -----

ICNN <Room 414+415>

----- Lunch 11:45-13:30 -----

Oral, Monday, 22 April PM

ALPS <Room 303>

[ALPS2] 13:45-15:15
High peak power lasers, high pulse energy lasers and applications (2)
Chair: Takaaki Morita
Hamamatsu Photonics K.K.

ALPS2-01 13:45 *Invited*

The latest experimental results on laser-driven particle acceleration at ELI-NP

Domenico Doria
ELI-NP

Experimental campaigns for the commissioning of the 10 PW target areas of ELI-NP were carried out last year. The E1 area, dedicated to experiments with short focal parabolic mirror, was commissioned by investigating proton acceleration via TNSA mechanism. Protons with energy up to 150 MeV have been attained. The E6 area, dedicated to experiments with long focal mirror, was also commissioned via LWFA of electrons and a maximum electron energy of about 4 GeV was achieved.

ALPS2-02 14:15

New Compressor Plan for 100PW Super-high and Ultra-short Laser Based on the Biggest Gratings with Size of 1620 mm×1070 mm

Yunxia Jin[1], Jianda Shao[1], Cheng Wang[1], Yuxing Han[1], Yuxin Leng[1], Ruxin Li[1,2]
[1]Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China, [2]Zhangjiang Laboratory, Shanghai, China

SIOM is manufacturing the world's largest metal pulse compressed grating with LIDT over 0.3 J/cm^2 and size of 1620 mm×1070 mm to support 100 PW individual beam with pulse width of 15fs.

ALPS <Room 413>

[ALPS4] 13:30-15:00
Optical devices and techniques for bio and medical applications (1)
Chair: Masato Ohmi
Osaka University

ALPS4-01 13:30 *Invited*

Long-range imaging using swept-source OCT based on HCG-VCSEL

Hsiang-Chieh Lee[1,2]
[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, [2]Department of Electrical Engineering, National Taiwan University

We have developed a long-range swept-source optical coherence tomography imaging system employing an HCG-VCSEL light source. Example OCT imaging and axial length measurement of the model-eye are demonstrated at an A-scan rate of 30 kHz.

ALPS4-02 14:00

Development of a multi-view OCT system based depth-encoded multiplexing

Pei-Chen Sung[1], Zi-Wen Kao[1], Fang-Ying Hua[2], Ting-Hao Chen[1], Heng-Yu Li[1], Chuan-Bor Chueh[1], Yin-Lin Wang[2], Hsiang-Chieh Lee[1,3]
[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei 10617, Taiwan, [2]Department of Dentistry, National Taiwan University Hospital, Taipei 10617, Taiwan, [3]Department of Electrical Engineering, National Taiwan University, Taipei, 10617 Taiwan

This study has developed a novel OCT system allowing acquisition of multi-view dental OCT images using depth-encoded multiplexing in a single acquisition. Incorporating the imaging stitching algorithm, the aforementioned system aim to reduce shadowing artefacts.

ALPS4-03 14:15

***Ex vivo* study of photothermolysis induced by laser therapy with dynamic optical coherence tomography (OCT)**

Yin-Shen Cheng[1], Tai-Ang Wang[1], Hsiang-Chieh Lee[1], Meng-Tsan Tsai[2,3]
[1]National Taiwan University, [2]Chang Gung University, [3]Chang Gung Memorial Hospital

This study introduces dynamic algorithm-based OCT for laser therapy monitoring on ex vivo porcine liver. The result shows that dynamic image can illustrate ablated area and display the extent of photothermolysis.

ALPS <Room 511+512>

[ALPS7] 14:00-15:30
Novel optical materials/structure and applications (2)
Chairs: Shunsuke Kurosawa
Tohoku University
Kentaro Miyata
RIKEN

ALPS7-01 14:00

SESAM mode-locked Tm,Ho:Ca(Gd,Y)AlO_4 laser at 2130 nm

Weidong Chen[1,2], Zhang-Lang Lin[1,2], Valentin Petrov[1], Uwe Griebner[1], Ge Zhang[2], Peixiong Zhang[3], Zhen Li[3], Zhenqiang Chen[3], Xavier Mateos[4], Pavel Loiko[5]
[1]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Max-Born-Str. 2a, 12489 Berlin, Germany, [2]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, 350002 Fuzhou, China, [3]Department of Optoelectronic Engineering, Jinan University, 510632 Guangzhou, China, [4]Universitat Rovira i Virgili, URV, Física i Cristal·lografia de Materials (FiCMA)- Marcel·lí Domingo 1, 43007 Tarragona, Spain, [5]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, 6 Boulevard Maréchal Juin, 14050 Caen Cedex 4, France

We demonstrate a SESAM mode-locked Tm,Ho:Ca(Gd,Y)AlO_4 laser delivering soliton pulses as short as 114 fs at 2130 nm with an average output power of 142 mW at a pulse repetition rate of ~80.5 MHz.

ALPS7-02 14:15 *Invited*

Layered lanthanide molybdate phosphors: Control of morphology, crystal phase, and luminescence properties

Takuya Hasegawa, Suzuka Noda, Ayahisa Okawa, Shu Yin
Tohoku University

Single crystalline emissive double molybdates, A$Eu(MoO_4)_2$ (A = Na, K, Rb, and Cs), which have attracted a lot of attention, were successfully synthesized by varying the molar ratio of A/Eu through a one-pot hydrothermal route.

ICNN <Room 414+415>

[ICNN2] 13:30-15:00
Session 1
Chair: Satoshi Iwamoto
The University of Tokyo

ICNN2-01 13:30 *Invited*

Silicon-based metamaterial antennas and optical phased arrays

Winnie N. Ye[1], Daniel Benedikovic[1,2], Qiankun Liu[1], Shahrzad Khajavi[1], Daniele Melati[5], Pavel Cheben[3], Tom Smy[1], Ahmad Atieh[4], Alejandro Sánchez Postigo[1,6], Jens Schmid[3], Xiaochen Xin[1]
[1]Carleton University, Ottawa, Canada, [2]University of Zilina, Zilina, Slovakia, [3]National Research Council Canada, Ottawa, Canada, [4]Optiwave Systems, Inc., Ottawa, Canada, [5]Centre for Nanoscience and Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France, [6]Telecommunication Research Institute, Universidad de Malaga, Malaga, Spain

Integrated silicon photonics introduces Optical Phased Arrays (OPAs), a breakthrough in free-space satellite communications and LIDAR. Overcoming limitations of conventional technologies, silicon-based OPAs offer compact, high-resolution, and energy-efficient beam steering. Recent advancements in concentric ring-organized chip-scale silicon OPAs effectively suppress sidelobes, expanding the steering range and achieving narrower beamwidths.

ICNN2-02 14:00 *Invited*

Development of the ultralow-loss phase change material Sb_2Se_3 for non-volatile programming of nanophotonic devices

Otto L Muskens, Daniel Lawson, Sophie Blundell, Matthew Delaney, Ioannis Zeimpekis
University of Southampton

Progress will be presented in the development and application of Sb_2Se_3 as a new phase change material for programmable nanophotonics with ultralow losses, high index and switching endurance exceeding one million write-reset cycles.

Oral, Monday, 22 April PM

OPTM <Room 213>

[OPTM-OP] 13:45-14:00
Opening Remarks
Chairs: Toru Yoshizawa
NPO 3D Associates
Rainer Tutsch
TU Braunschweig
Yukitoshi Otani
Utsunomiya University

[OPTM1] 14:00-15:00
Session1
Chairs: Rainer Tutsch
TU Braunschweig
Yukitoshi Otani
Utsunomiya University

OPTM1-01 14:00 ***Invited***

A manufacturing system of large free-form optics

Mikio Kurita[1,2]
[1]Kyoto University, [2]LogistLab Inc.

I propose a new manufacturing system of large free-form optics. The system can polish and measure a mirror over 2 m with a robot arm by replacing the polishing tool and measurement probe on the arm end. The measuring method is a three-point method that provides the cross-section of the mirror without a standard and is applicable to free-form. The architecture and performance of the system will be presented in my talk.

Oral, Monday, 22 April PM

ALPS <Room 303>

ALPS2-03 14:30

High Efficient 10 -fold Post Compression in Solids

Shaobo FANG[1,2], Yuzhe LIU[1,2]
[1]Institute of Physics Chinese Academy of Sciences, [2]University of Chinese Academy of Science

We demonstrated a nearly 10-fold compression in all-solid-state multi-pass cell, the output is successfully compressed down to 18.5 fs, 176 μJ at 50 kHz repetition rate, resulting 8.8 GW peak power and 88% output efficiency.

ALPS2-04 14:45

High contrast sub-10 fs pulses from cross-polarized wave generation in multiple thin BaF_2 plates

Xianzhi Wang[1], Zhaohua Wang[1,2,3], Jiajun Li[1,2], Jiawen Li[1,2], Zhiyi Wei[1,2,3]
[1]Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, [2]Department of Physics, University of Chinese Academy of Sciences, [3]Songshan Lake Materials Laboratory

High contrast broadband pulses of 110 μJ were generated by cross-polarized wave generation in multiple thin BaF_2 plates. The contrast was enhanced by 4 order of magnitude while the duration was compressed by 3.9 times.

ALPS2-05 15:00

Femtosecond laser processing of chalcogenide glass thin films

Rajeev Rajendran[1], Soumya Suresh[2], Arun Pappachan[2], Sheenu Thomas[2], Anoop Kiliyanamkandy[1]
[1]Department of Physics, Cochin University of Science and Technology, Cochin, India, [2]International School of Photonics Cochin University of Science and Technology, Cochin, India

Traditional approaches to nanostructuring chalcogenide glass often rely on non-laser methods. This study investigates the use of femtosecond laser processing as a potentially more efficient, precise, and versatile technique for fabricating nanostructures in thin films.

----- Coffee Break 15:15-15:30 -----

[ALPS3] 15:30-16:30
High peak power lasers, high pulse energy lasers and applications (3)
Chair: Jumpei Ogino
Osaka University

ALPS3-01 15:30 ***Invited***

Faraday isolation and harmonic conversion (2ω , 3ω) on high energy kilowatt laser Bivoj

Martin Divoký[1], Jonathan Phillips[2], David Vojna[1], Jan Pilar[1], Ondrej Slezak[1], Martin Hanus[1], Petr Navratil[1], Ondrej Denk[1], Tomas Paliesek[1], Patricie Severova[1], Danielle Clarke[2], Martin Smrz[2], Thomas Butcher[2], Tomas Mocek[1]
[1]HiLASE Centre, Institute of Physics, Czech Academy of Sciences, [2]Central Laser Facility, STFC Rutherford Appleton Laboratory

We report on large aperture Faraday isolator for kW pulsed laser with 30 dB isolation ratio, on harmonic conversion to 95 J @515 nm (950 W average power) and 50 J @ 343 nm (500 W average power) at the repetition rate of 10 Hz.

ALPS <Room 413>

ALPS4-04 14:30

3D Visualization and Time-lapse Observation of Surgical Sutures by OCT

Fengcheng Wei
Osaka University

Since there is seldomly has in-vivo researches on biomaterials for dermatology due to its difficulties, we made an approach to applied OCT to visualize 3D-images and measured time-lapse changes of surgical sutures.

ALPS4-05 14:45

Handheld Biosensor System Based on a Gradient Guided-Mode Resonance Device

Chien Chieh Chiang, Wen-Chun Tseng, Wen-Tsung Tsai, Cheng-Sheng Huang
Department of Mechanical Engineering, National Yang Ming Chiao Tung University

This study introduces an handheld device utilizing a gradient guided-mode resonance sensor. Multiplexed detection of albumin and creatinine at concentrations of 0–500 and 0–10000 μg/mL showed corresponding LODs of 0.66 and 0.61 μg/mL.

----- Coffee Break 15:00-15:30 -----

[ALPS5] 15:30-16:30
Optical devices and techniques for bio and medical applications (2)
Chair: Yuji Matsuura
Tohoku Univ.

ALPS5-01 15:30 ***Invited***

Development of photoacoustic microscopy for biomedical applications

Yoshihisa Yamaoka
Komatsu University

Recently, we have proposed the introduction of a liquid-crystal element of adaptive optics and combination of two-photon absorption in photoacoustic microscopy (PAM). These techniques improve the spatial resolution and imaging contrast in deep tissues.

ALPS <Room 511+512>

ALPS7-03 14:45

Synthesis and luminescence properties of Ce-doped stannite-type silicate phosphors

Natsuki Shimoyama[1], Shohei Kodama[1], Taiga Nishii[1], Shunsuke Kurosawa[2,3,4], Ikuo Yanase[1], Hiroaki Takeda[1]
[1]Saitama University, [2]Institute for Materials Research, Tohoku University, [3]New Industry Creation Hatchery Center, Tohoku University, [4]Institute of Laser Engineering, Osaka University

This study reports the luminescence properties of Ce-doepd silicate phosphors with the stannite-type A_2BCO_4 (*A*: monovalent cation, *B*: divalent cation, *C*: Si) crystal structure.

ALPS7-04 15:00

Synthesis of high surface perovskite quantum dot aerogel for degradation rhodamine B under visible light

Dai-Mei Lin, Tai-Yuan Chen, Chia-Wun Dai, Guan-Ru Lin, Pin-Hsuan Hsu, Da-Xun Wang, Chia-Ching Wu
Department of Applied Science/National Taitung University

In this study, highly stable $CsPbIBr_2$ nanocrystals with nitrogen-doped graphene quantum dots (N-GQD-$CsPbIBr_2$) were successfully synthesized. The N-GQDs-$CsPbIBr_2/TiO_2$ aerogel was synthetized for use as photocatalysts, and they enhanced the degradation of RhB under visible light.

ALPS7-05 15:15

3D Micro-Raman Tomographic Measurement on Subsurface of Magnesium Silicide Wafer

Kazuma Watanabe, Teppei Onuki, Hirotaka Ojima, Jun Shimizu, Libo Zhou, Haruhiko Udono
Ibaraki University

Mg_2Si, are expected to be applied to infrared photosensors and thermo-photovoltaic cells. Microscopic and tomographic observation was conducted on subsurface of magnesium silicide wafer using confocal Raman microscope to evaluate machined surface quality.

----- Coffee Break 15:30-15:45 -----

ICNN <Room 414+415>

ICNN2-03 14:30

Meta-microscope for phase contrast imaging

Cheng Hung Chu[1], Yu-Hsin Chia[1], Hung-Chuan Hsu[1], Sunil Vyas[1], Takuo Tanaka[2], Pan-Chyr Yang[1], Din Ping Tsai[3], Yuan Luo[1]
[1]National Taiwan University, [2]RIKEN Center for Advanced Photonics, [3]City University of Hong Kong

We propose an ultracompact meta-microscope for optical phase contrast imaging, using metalenses and a spiral metasurface, which successfully images various bio-samples. ResNet is integrated with the meta-microscope to convert the bright-field images into edge-enhanced ones.

ICNN2-04 14:45

Varifocal Meta-devices from 1D to 3D for Bioimaging and Future 6G Communication

Jingcheng Zhang, Mu Ku Chen, Din Ping Tsai
City University of Hong Kong

Meta-devices enable advanced optical and THz applications, such as bioimaging and 6G communications. we design, fabricate, and implement a dielectric Moiré metalens for fluorescence imaging. We also report the synthetic phase design of rotary doublet Airy beam and triplet Gaussian beam varifocal meta-devices to fully control the terahertz beam's propagation direction and coverage area.

----- Coffee Break 15:00-15:20 -----

[ICNN3] 15:20-16:50
Session 2
Chair: Jun Tatebayashi
Osaka University

ICNN3-01 15:20 ***Invited***

Gap-Plasmon-Enhanced Superconducting Photon Detectors at Single-Photon Level

Yu-Jung Lu[1,2]
[1]Academia Sinica, [2]National Taiwan University

We developed a novel system that integrates NbN superconducting microwire photon detectors with gap-plasmon resonators to improve the photon detection efficiency to 98% while preserving all detector performance features, such as polarization insensitivity.

Oral, Monday, 22 April PM

OPTM <Room 213>

OPTM1-02 14:30

Why are shiny surfaces optically non-cooperative?

Rainer Tutsch, Markus Petz
TU Braunschweig

In our presentation we discuss the effect of aberrations in the presence of specular reflections in optical metrology, show the results of experiments and simulations and propose a technique to reduce the errors.

OPTM1-03 14:45

Traceable sphericity measurements of spherical sections at PTB

Markus Cornelius Schake
Physikalisch-Technische Bundesanstalt

The first results of a long-term experiment to determine the form stability of the transmission spheres employed for calibration purposes at PTB are presented. The results imply consistency of the uncertainty in the sphericity measurement of the transmission spheres under varying reproducibility conditions with the currently employed expanded measurement uncertainty.

----- Coffee Break 15:00-15:30 -----

[OPTM2] 15:30-17:00
Session 2

Chairs: Jessica Onaka
Utsunomiya University
Mikio Kurita
Kyoto University

OPTM2-01 15:30 ***Invited***

Development of a Triangulation-Based Laser Displacement Meter for On-machine Measurement

Tatsuki Otsubo, Takanori Yazawa
Nagasaki University

We developed a laser displacement meter for on-machine measurement. The developed laser displacement meter can eliminate motion errors of machine tool axes and environmental vibrations.

Oral, Monday, 22 April PM

ALPS <Room 303>

ALPS3-02 16:00

High Peak Power Hybrid Nd:YVO_4 Laser with Tuneable Repetition Rate

Jin Hyuck Choi[1], Wonseon Choi[1], Myeong Hwan Kim[1], Bong-Ahn Yu[1], Young Su Kim[2], Ji Yoon Gwag[2], Eui Seung Son[3], Jeongeon Kang[3], Seong Ku Lee[1]
[1]Gwangju Institute of Science and Technology, [2]Hanwha systems, [3]Defense Rapid Technology Research Institute

We developed a repetition-rate tuneable hybrid Nd:YVO_4 laser with high peak power. The laser peak power at 532 nm ranged from 1.0 to 0.7MW at the repetition rate from 7.5 to 15 kHz. M_x^2 and M_y^2 at 10 kHz were 1.3 and 1.1, respectively.

ALPS3-03 16:15

Self-similar evolution of amplifier similariton through a bifurcation path in a near-zero net cavity dispersion Yb-doped fiber laser

Xinxu Duan, Hongbo Jiang, Yuantong Liu, Zhengxin Gao, Lei Jin
Harbin Engineering University

We observed the bifurcate self-similar evolution of amplifier similariton by simulation in an Yb-doped fiber laser with near-zero net cavity dispersion. Distinct convergent solutions under identical conditions result in the bifurcation.

ALPS <Room 413>

ALPS5-02 16:00

Mid-infrared Photoacoustic Spectroscopy Using Piezoelectric Transducer For Non-invasive Blood Component Analysis

Kiiko Aiba, Saiko Kino, Yuji Matsuura
Tohoku University

In photoacoustic spectroscopy detecting ultrasounds produced by irradiation of infrared pulsed light, a method for inducing resonance by varying the pulse modulation frequency was investigated. Using this method, we obtained photoacoustic spectra of human skin.

ALPS5-03 16:15

Simplified Photothermal Deflection Spectroscopy System for Non-Invasive Biological Tissue Analysis

Hiroto Ito, Saiko Kino, Yuji Matsuura
Tohoku University

A photothermal deflection spectroscopy system that detects the heat generated by mid-infrared light absorption was realized using a simplified system. The effectiveness of this system was confirmed by measuring glucose solution and human fingertips.

ALPS <Room 511+512>

[ALPS8] 15:45-17:00
Novel optical materials/structure and applications (3)
Chair: Valentin Petrov
Max Born Institute

ALPS8-01 15:45 ***Invited***

Single crystal fibers for direct amplification of femtosecond optical vortices

Yongguang Zhao
Jiangsu Normal University

We exploit a straightforward approach to directly amplify a femtosecond optical vortex by using a single-crystal fiber amplifier system, the spatial and temporal features can be well-conserved during the amplification.

ALPS8-02 16:15

Sub-80-fs all-solid-state Kerr-lens mode-locked laser based on Yb:$GdScO_3$ crystal

Si yuan Niu
Xidian University

We report on a Kerr-lens mode-locked laser based on Yb:$GdScO_3$ crystal for the first time. Pulses as short as 74 fs at 1061.8 nm with an average output power of 182 mW was obtained.

ALPS8-03 16:30

Topological texturing and structuring of tungsten using optical vortex femtosecond laser ablation

Haruki Kawaguchi[1,2], Ryo Yasuhara[1,2], Haotian Yang[2], Reina Miyagawa[3], Koji Sugioka[4], Chika Hori[1], Masato Ota[1,2], Hiyori Uehara[1,2]
[1]National Institute for Fusion Science, National Institutes of Natural Sciences, [2]The Graduate University for Advanced Studies, SOKENDAI, [3]Department of Physical Science and Engineering, Nagoya Institute of Technology, [4]RIKEN, Center for Advanced Photonics

We have demonstrated the formation of laser-induced periodic surface structures (LIPSS) on tungsten using a vector vortex laser. The vector vortex laser processing provided attractive 2-dimensional chiral texturing and 3-dimensional topological structuring on tungsten.

ALPS8-04 16:45

The impact of Er/Tm impurities in Yb:YLF on anti-Stokes fluorescence cooling

Stefan Pueschel, Christian Kränkel, Hiroki Tanaka
Leibniz Institut für Kristallzüchtung (IKZ)

Energy transfer processes from Yb^{3+} to Er^{3+} and Tm^{3+} in YLF are investigated to quantify their influence on anti-Stokes fluorescence cooling. We revealed that Er^{3+} causes a significant intensity dependence on the laser cooling efficiency.

ICNN <Room 414+415>

ICNN3-02 15:50

Current-crowding-free superconducting nanowire single-photon detectors enabled by local helium ion irradiation

Stefan Strohauer[1], Fabian Wietschorke[2], Christian Schmid[2], Stefanie Grotowski[1], Lucio Zugliani[2], Rasmus Flaschmann[2], Björn Jonas[2], Kai Mueller[2], Jonathan Finley[1]
[1]Walter Schottky Institute and School of Natural Sciences, Technical University of Munich, Germany, [2]Walter Schottky Institute and School of Computation, Information and Technology, Technical University of Munich, Germany

Local helium ion irradiation is utilized to enhance the sensitivity of superconducting nanowire single-photon detectors (SNSPDs) while preserving the high switching current of unirradiated SNSPDs. This enables current-crowding-free SNSPDs with unity internal quantum efficiency for 1550 nm photons.

ICNN3-03 16:05

Enhancing detection efficiency of superconducting nanowire single-photon detectors by modifying thermal conductance via helium ion irradiation

Fabian Wietschorke[1], Stefan Strohauer[2], Markus Döblinger[3], Christian Schmid[1], Lucio Zugliani[1], Stefanie Grotowski[2], Rasmus Flaschmann[1], Björn Jonas[1], Jonathan Finley[2], Kai Müller[1]
[1]Walter Schottky Institute and Department for Electrical and Computer Engineering, Technical University of Munich, Germany, [2]Walter Schottky Institute and Physics Department, Technical University of Munich, Germany, [3]Department of Chemistry, Ludwig-Maximilians-Universität München, 81377 Munich, Germany

We investigated the influence of Helium ion irradiation on NbTiN deposited on a Si/SiO_2 wafer in regards of electrical and thermal transport properties and found a decrease in heat conductance from superconductor to the substrate.

ICNN3-04 16:20

Nonscattering Inspection of Surface Plasmon Polaritons Steering – a Graphene Photodetector

Chia-Hung Wu[1], Kuo-Ping Chen[2]
[1]National Yang Ming Chiao Tung University, [2]National Tsing Hua University

Light-matter interaction between graphene and surface plasmon polaritons was investigated. Graphene was embedded in a plasmonic system for nonscattering detection with photoresponsivity of 15 mA/W. This concept may be applicable in future nanoscale integrated circuits.

ICNN3-05 16:35

Investigation of High Brightness Blue Quantum Dot Light-Emitting Diodes with Hybrid Charge Transport Layers

Lin Chien Lin, Chang Chih En, Shi Jing Teng, Yu Hsin Chieh
National Yang Ming Chiao Tung University

MgZnO nanoparticles with various Mg compositions was used as electron transport layer (ETL) for quantum dot light emitting diodes (QLEDs) fabrication, the maximum luminance (L_{max}) of QLEDs with $Mg_{0.15}Zn_{0.85}O$ can be up to 48,865 cd/m^2.

Oral, Monday, 22 April PM

OPTM <Room 213>

OPTM2-02 16:00

In-process Evaluation of Water Jet Dynamics in Water Jet Guided Laser Processing through Observation of Raman Scattering

Shoichi Ui, Mayuko Osawa, Shotaro Kadoya, Masaki Michihta, Satoru Takahashi
Dept. of Precision Engineering, The University of Tokyo

A novel in-process evaluation method of water jet condition in WJGL processing utilizing Raman scattering was proposed and visualization of water jet dynamics as a waveguide function in every laser pulse was achieved.

OPTM2-03 16:15

Measurement of surface form of freeform optics using non-contact multiwavelength interferometry

Jayesh Navare[1], Neil Fitzgibbon[1], Gabrielle Le Doeuff[2]
[1]Taylor Hobson Ltd., [2]AMETEK GmbH

This paper investigates the feasibility of measuring surface form of freeform optics using non-contact multiwavelength interferometry. A bi-conic lens, which is one of the most fundamental freeform optics, was measured on a non-contact multiwavelength interferometer.

OPTM2-04 16:30

Effect of training dataset on vision-based position identification using convolutional neural network

Risako Mita, Kotaro Mori, Daisuke Kono
Kyoto University

Convolutional neural network was used for identifying the target marker's position in vision-based displacement measurement. Three datasets were created and the effect of training dataset on the accuracy of position identification was investigated.

OPTM2-05 16:45

Fundamental investigation on subpixel resolution in motion capturing by function fitting method

Daisuke Kono
Kyoto University

The limitation of subpixel resolution in motion capturing by the function fitting method was investigated using simulation. The detection limit and the relationship between the bit number of A/D conversion and subpixel resolution were discussed.

Oral, Tuesday, 23 April AM

ALPS <Room 303>

[ALPS9] 9:15-10:30
Novel solid state / fiber / diode lasers and applications (1)
Chair: Shotaro Kitajima
Nagoya Univ.

ALPS9-01 9:15 ***Invited***

Femtosecond fiber lasers in the visible spectrum: achievements and prospects
Michel Olivier[1,2], Marie-Pier Lord[1], Martin Bernier[1], Réal Vallée[1]
[1]Université Laval, [2]Cégep Garneau
The recent development of the first femtosecond fiber laser at visible wavelengths and its complete theoretical modeling is presented. Potential development avenues such as the operation at other wavelengths and alternate cavity designs are discussed.

ALPS9-02 9:45

Low-doped Tb:YLF for direct blue laser
Moritz Badtke, Sascha Kalusniak, Stefan Püschel, Hiroki Tanaka, Christian Kränkel
Leibniz-Institut für Kristallzüchtung
Low-doped Tb^{3+}:YLF samples exhibit strong fluorescence from the $^5D_3$ multiplet under UV excitation due to decreasing cross-relaxation strength. We evaluate the potential of this emission for direct violet or blue lasing.

ALPS9-03 10:00

Phase Detection using Second Harmonic Generation in Divided Pulse Amplification
Haruyuki Miyake, Kazuki Yoshizawa, Akira Shirakawa
The University of Electro-Communications
A new method is proposed to detect phase differences between divided pulses using second harmonic generation in divided pulse amplification for a large number of divisions. Detection in four pulses to two pulses was demonstrated.

ALPS9-04 10:15

Towards Amplification of All Normal Dispersion Mode-locked Fiber Laser using Multicore Fiber
Yasufumi Yogi
Institute for Laser Science, The university of Electro-Communications
We have developed a mode-locked fiber laser as a seed pulse source for pulse amplification using multicore fiber. The pulse was injected into a multicore fibre and coupled to the in-phase mode.

ALPS <Room 413>

[ALPS13] 10:00-11:30
Terahertz devices, nonlinear optics and applications (1)
Chairs: Osamu Kojima
Chiba Institute of Technology
Yu Tokizane
Tokushima Univ.

ALPS13-01 10:00 ***Invited***

Towards quantum-enhanced THz sensing
Dionysis Adamou[2], Lennart Hirsch[2], Taylor Shields[2], Seungjin Yoon[2], Adetunmise C. Dada[2], Jonathan M. R. Weaver[2], Daniele Faccio[2], Lucia Caspani[3], Marco Peccianti[4], Matteo Clerici[1,2]
[1]University of Insubria, Como, Italy, [2]University of Glasgow, Glasgow, UK, [3]University of Strathclyde, Glasgow, UK, [4]University of Loughborough, Loughborough, UK
THz time-domain spectroscopy is important for fundamental studies and applications. Being limited by the probing pulse shot noise, quantum metrology could enhance its sensitivity. We shall present our first attempts in this direction.

ALPS <Room 511+512>

[ALPS15] 10:15-11:45
Novel optical materials/structure and applications (4)
Chairs: Kentaro Miyata
RIKEN
Shunsuke Kurosawa
Tohoku University

ALPS15-01 10:15 ***Invited***

Fluorooxoborates: Novel Candidates for Deep-UV Nonlinear Optical Materials
Shilie Pan, Miriding Mutailipu
Xinjiang Technical Institute of Physics & Chemistry, Chinese Academy of Sciences
Fluorooxoborates have been considered as the new fertile fields for searching the deep-UV NLO materials. AB_4O_6F and $MB_5O_7F_3$ family not only inherit the favorable structural characteristics of KBBF, but also possess superior optical properties. Both two series possess the optical properties required for the deep-UV NLO applications, which make them potential candidates to produce the deep-UV coherent light by the direct SHG process.

HEDS <Room 311+312>

[HEDS1] 9:00-10:15
Collisionless Shock 1
Chair: Takayoshi Sano
Osaka University

HEDS-OP 9:00

Opening Remarks
Ryosuke Kodama
Osaka University

HEDS1-01 9:10 ***Invited***

Overview of Laboratory Astro-Particle Physics Experiments at Laser and Accelerator Facilities
Gianluca Gregori
University of Oxford
We will an overview of selected experiments performed at high-power laser facilities to study the propagation of high energy charged particles through magnetized and turbulent plasmas. We will also present newer experiments performed at the CERN's accelerator complex aimed at recreating a laboratory analogue of ultra-relativistic blazar-induced pair jets propagating into the intergalactic tenuous plasma.

HEDS1-02 9:50 ***Invited***

Laboratory investigation on particle energization through magnetized shocks and associated instabilities
Weipeng Yao[1,2], Andrea Ciardi[2], Julien Fuchs[1]
[1]LULI - CNRS, CEA, UPMC Univ Paris 06 : Sorbonne Universite, Ecole Polytechnique, Institut Polytechnique de Paris - F-91128 Palaiseau cedex, France, [2]Sorbonne Universite, Observatoire de Paris, Universite PSL, CNRS, LERMA, F-75005, Paris, France
The origin of energetic non-thermal particles in the Universe is an open question. Collisionless shocks [1-3], with their associated instabilities [4], can transfer energy to particles during their interaction with ambient plasma. Using high-power lasers coupled with strong magnetic fields, we can produce such shocks and instabilities in the laboratory and observe the energization of protons.

----- Coffee Break 10:15-10:35 -----

Oral, Tuesday, 23 April AM

ICNN <Room 414+415>

[ICNN4] 9:30-10:30
Session 3
Chair: Yasutomo Ota
Keio University

ICNN4-01 9:30 ***Invited***

Van der Waals hybrid photonic devices
Yuichiro Kato
RIKEN
The unique optical properties of two-dimensional layered materials are attractive for achieving increased functionality in integrated photonics. Owing to the van der Waals nature, these materials are ideal for integrating with nanoscale photonic structures. Here we present some examples of the van der Waals hybrid photonic devices.

ICNN4-02 10:00 ***Invited***

Integration of heterogeneous photonic chiplets by μ-transfer printing
Rai Kou, Koji Yamada
National Institute of Advanced Industrial Science and Technology
Recent progress and future prospects for miniaturized heterogeneous integration using μ-transfer printing method will be presented. Current silicon photonic devices with this approach can realize compact laser sources, isolators, modulators, frequency comb sources and 3D-stacked photonic devices.

LDC <Room 301>

[LDC-OP] 9:45-10:00
Opening Remarks
Chair: Sunao Kurimura
National Inst. for Materials Science

[LDC1] 10:00-10:45
Keynote 1
Chair: Sunao Kurimura
National Inst. for Materials Science

LDC1-01 10:00 ***Invited***

Next generation MR 3D near eye display
Jae-Hyeung Park
Inha University
Near eye display is a key device for many mixed reality applications. However, despite the increasing interest and optimistic expectations, the current mixed reality near eye displays still have many challenges. In this talk, we will review the current status and the remaining challenges of the mixed reality near eye displays. We will also introduce recent research approaches and achievements with a vision for the future mixed reality near eye displays.

LSSE <Room 316>

[LSSE1] 9:25-10:30
Opning & Carbon-Neutral 1
Chair: Takeharu Murakami
RIKEN

LSSE-OP 9:25
Opening Remarks

LSSE1-01 9:30 ***Invited***

Fabrication of Cot-Effective Carbon-Based Multiporous-Layered-Electrode Perovskite Solar Cells
Seigo Ito
Univ. Hyogo
Porous-carbon-electrodes have been fabricated in perovskite solar cells, which have multi-porous-layered electrodes of TiO_2, ZrO_2 and carbon. The perovskite precursor is deposited through porous electrodes of TiO_2, ZrO_2 and carbon, resulting in multi-porous-layered electrode perovskite solar cells (MPLE-PSCs). In the conference, challenging works of high thermal stability over 100 °C are presented.

LSSE1-02 10:00 ***Invited***

Unlocking the Potential of Perovskite Solar Cells: from Single-Junction to Tandem
Yi Hou
National Univ. Singapore
The commercialization of state-of-the-art inverted PSCs faces two main obstacles: interface recombination losses and degradation.To overcome these challenges, we have focused on the development of novel interface materials and innovative device design concepts.

OMC <Room 418>

[OMC1] 9:00-10:20
Student Session 1
Chairs: Rihito Tamura
Chiba University
Yusuke Minowa
Osaka University

OMC-OP 9:00
Opening Remarks
Yusuke Minowa
Osaka University

OMC1-01 9:05 ***Invited***

Advanced Optical Systems through Flat Optics for Biomedical Applications
Yuan Luo
National Taiwan University
This talk will introduce the latest studies on the biomedical use of structured light, as well as metasurface, and will also discuss the technological challenges presently encountered with metasurface from the point of view of preclinical and clinical systems.

OMC1-02 9:35

Microscopic theory of single molecule observation by tip-enhanced nonlinear Raman scattering
Hiroyuki Ikagawa[1], Mamoru Tamura[2], Hajime Ishihara[1]
[1]Osaka University, [2]Osaka University, Osaka Metropolitan University
We developed a microscopic theory for tip-enhanced anti-Stokes Raman scattering (TECARS), which is capable to evaluate the single molecule response, and successfully visualized the TECARS map for dipole-forbidden transition in pentacene.

OMC1-03 9:50

Three-dimensional optical trapping using cubic phase metasurface
Hung-Chuan Hsu[1], Hsin Yu Kuo[2], Sunil Vyas[2], Cheng Hung Chu[3], Kuang-Yuh Huang[1], Hsien-Shun Liao[1], Din Ping Tsai[4,5,6], Yuan Luo[2,3,7,8]
[1]Department of Mechanical Engineering, National Taiwan University, [2]Institute of Medical Devices and Imaging System, National Taiwan University, [3]YongLin Institute of Health, National Taiwan University, [4]Department of Electrical Engineering, City University of Hong Kong, [5]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [6]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, [7]Department of Biomedical Engineering, National Taiwan University, [8]Graduate School of Advanced Technology, National Taiwan University
In biological research, the optical tweezer enables contactless manipulation of tiny objects. Using a cubic phase metasurface, we achieve 3D manipulation of microscale particles with a compact, polarization-independent system, offering significant potential for diverse applications in optics and imaging.

OMC1-04 10:05

Selection of fluorescent nanodiamonds using resonant optical force
Yoshiki Saito[1], Yuto Makino[1,2], Takao Horai[1], Yosuke Minowa[1], Hajime Ishihara[1], Masaaki Ashida[1]
[1]Osaka University, [2]Daicel Corporation
Resonant optical manipulation is a powerful method for selectively transporting nanoparticles based on quantum properties. However, the limitations of its performance have not been fully elucidated. This study successfully demonstrates nanodiamonds containing a few silicon-vacancy centers.

----- Coffee Break 10:20-10:45 -----

Oral, Tuesday, 23 April AM

OPTM <Room 213>

[OPTM3] 9:15-10:15
Session 3
Chairs: Hunglin Hsieh
National Taiwan University of Science and Technology
Tatsuki Otsubo
Nagasaki University

OPTM3-01 9:15

Observation of Potential Failures in Ceramic Cutting Tools Using Microscopic Raman Imaging
Teppei Onuki, Ryohei Tazawa, Shuo Liu, Hirotaka Ojima, Jun Shimizu, Libo Zhou
Ibaraki University

Tool conditions in cutting edge and grinding wheel were investigated using microscopic Raman imaging method. The Raman images revealed hidden abnormality like micro cracks, residual stress, chip adhesion that is invisible in conventional observation.

OPTM3-02 9:30

Development of mode-locked mid-infrared laser and its repetition frequency control
Hiraku Matsukuma, Masashi Nagaoka, Hisashi Hirose, Ryo Sato, Wei Gao
Tohoku University

A mode-locked mid-infrared laser is developed for precision metrology. We also developed the controlling method of repetition frequency.

OPTM3-03 9:45

Thermal and Angle Variation Effects on a Multimode Interferometer Operating in Reflection Mode by Fourier Phase Analysis
Tania Lozano Hernandez[1], Daniel Jauregui Vazquez[2], Julian M. Estudillo Ayala[1], Juan M. Sierra Hernandez[1], Roberto Rojas Laguna[1], Isai Espinoza Torres[3]
[1]Departamento de Ingeniería Electrónica, División de Ingenierías Campus Irapuato Salamanca, Universidad de Guanajuato, Carretera Salamanca-Valle de Santiago, Salamanca 36885, México, [2]Centro de Investigación Científica y de Educación Superior de Ensenada, División de Física Aplicada-Departamento de Óptica, Carretera Ensenada-Tijuana, No. 3918, Zona Playitas, Ensenada 22860, México, [3]Graduate School of Engineering, Hiroshima University 1-4-1 Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8527, Japan

This study explores the modal sensitivity of a long reflective multimode optical fiber device for angle and temperature detection. Fourier phase analysis enables precise angle detection (1.52 rad/°, 3.4°) with minimal thermal impact (0.0062 rad/°C).

SLPC <Room 416+417>

[SLPC-OP] 8:45-9:00
Opening Remark of SLPC 2024
Chairs: Masahiro Tsukamoto
Osaka University
Yuji Sato
Osaka University

[SLPC1] 9:00-10:30
Additive Manufacturing / Selective Laser Melting
Chairs: Yuji Sato
Osaka University
Masahiro Tsukamoto
Osaka University

SLPC1-01 9:00 ***Invited***

Numerical Microstructure Evolution for Laser Powder Bed Fusion Process by Lattice Boltzmann and Multi-Phase Field Methods
Sukeharu Nomoto, Jun Katagiri, Masahiro Kusano, Tomonori Kitashima, Makoto Watanabe
National Institute for Materials Science

A three dimensionally integrated numerical method using lattice Boltzmann method and multi-phase field method is proposed for simulating melting and solidification of metal alloy in laser powder bed additive manufacturing process. Simulations are performed in conditions of different beam power values. Simulated solidified microstructures are confirmed to be qualitatively agreement with experimental measurements.

SLPC1-02 9:30

Understanding Printability of Metal Matrix Composite from Selective Laser Melting Process Using Analytical and Numerical Approaches
Patcharapit Promoppatum[1], Bralee Chayasombat[2], Sasitorn Srisawadi[2], Dhritti Tanprayoon[2], Krisda Tapracharoen[2], Boonyakorn Tummake[2], Masahiro Ihama[3], Yuta Mizuguchi[3], Yuji Sato[3], Tetsuo Suga[3], Masahiro Tsukamoto[3], Ola L.A. Harrysson[4]
[1]Department of Mechanical Engineering, King Mongkut's University of Technology Thonburi, [2]National Metal and Materials Technology Center, [3]Joining and Welding Research Institute, Osaka University, [4]Edward P. Fitts Department of Industrial and Systems Engineering, North Carolina State University

This presentation explores additively manufactured metal-matrix composites (MMCs) using Inconel 718 alloy reinforced with titanium carbide (TiC). Through varied single track experiments, we explore melt pool morphologies, defect formation, and microstructural features. Employing analytical predictions and numerical approaches, alongside comprehensive experiments, we aim to understand the printability of these advanced materials.

SLPC1-03 9:45

Influence of Processing Parameters of Multi-Beam Laser Directed Energy Deposition on Microstructure and Defects of a CrMnFeCoNi High-Entropy Alloy
Kholqillah Ardhian Ilman[1,2], Yorihiro Yamashita[3], Takahiro Kunimine[4]
[1]Division of Mechanical Science and Engineering, Graduate School of Natural Science and Technology, Kanazawa University, Kakuma-machi, Kanazawa, Ishikawa, 920-1192, Japan, [2]Department of Mechanical Engineering, Faculty of Engineering, Universitas Muhammadiyah Surakarta, Sukoharjo, Central Java, 57169, Indonesia, [3]Department of Mechanical Engineering, National Institute of Technology, Ishikawa College, Kitachujo, Tsubata, Ishikawa, 929-0392, Japan, [4]Faculty of Mechanical Engineering, Institute of Science and Engineering, Kanazawa University, Kakuma-machi, Kanazawa, Ishikawa, 920-1192, Japan

This study explores single-bead CrMnFeCoNi HEA processing using multi-beam L-DED and modified laser focusing. It examines laser power and scanning speed effects on microstructure, defects, and bead cross-sectional area, providing insights for optimized HEA printing.

XOPT <Room 313+314>

[XOPT1] 9:15-10:20
XFEL1
Chair: Aymeric Robert
MAX IV Laboratory

XOPT-OP 9:15

Opening Remarks

XOPT1-01 9:20 ***Invited***

Active Q-switched X-Ray Regenerative Amplifier Free-Electron Laser
Jingyi Tang, Zhen Zhang, Jenny Morgan, Erik Hemsing, Zhirong Huang
SLAC National Accelerator Laboratory

In this talk I will discuss a novel scheme to achieve an active Q-switched cavity-based free electron laser. I will also present the experimental preparations undertaken for the CXBFEL R&D project at LCLS.

XOPT1-02 ***Withdraw***

XOPT1-03 9:50 ***Invited***

Overcoming challenges in the hard X-ray regime under high-heat load at EuXFEL: a diamond channel-cut monochromator as an alternative
Kelin Tasca, Anders Madsen, Ulrike Bösenberg, Alexey Zozulya, Roman Shayduk, Peter Zalden, Angel Rodriguez-Fernandez, Felix Brausse, Johannes Moeller, Joerg Hallmann, James Moore, Jan-Etienne Pudell, Wonhyuk Jo, Mohamed Youssef, Harald Sinn, Maurizio Vannoni, Liubov Samoylova
European XFEL

In this contribution, we will present the first results of the performance at room temperature and cryogenic cooling of the diamond channel-cut monochromator (DCCM) under the MHz repetition rate of the EuXFEL with sub-mJ pulses.

NOTE

Oral, Tuesday, 23 April AM

ALPS <Room 303>

----- Coffee Break 10:30-10:45 -----

[ALPS10] 10:45-12:00
Novel solid state / fiber / diode lasers and applications (2)
Chair: Kazuyuki Uno
Yamanashi Univ.

ALPS10-01 10:45 ***Invited***

Short-pulse High-power Photonic-crystal Surface-emitting Lasers
Takuya Inoue, Ryohei Morita, Masahiro Yoshida, Menaka De Zoysa, Kenji Ishizaki, Susumu Noda
Kyoto University

We review our recent demonstration of short-pulse high-power photonic-crystal surface-emitting lasers based on introduction of saturable absorbers and self-evolving photonic crystals. We realize short-pulse generation with 200-W-class peak powers and 30-ps-class pulse widths.

ALPS10-02 11:15

Single-Mode Distributed Feedback Lasing Based on a Uniform Grating and Auxiliary Passive Waveguide
Drew Maywar, Bryce Tennant
Rochester Institute of Technology

We present a single-mode DFB lasing mechanism exhibiting gain margin and power flatness superior to the λ/4-shifted DFB laser, enabled by offsetting direct- and exchange-Bragg photonic bandgaps of a uniform grating.

ALPS10-03 11:30

High-Order Dispersion Measurements of Chirped Fiber Bragg Grating with White-Light Interferometry
Qingyue Cui[1], Zhe Zhang[1], Zhuoran Li[1], Ke Zhan[1], Qingdian Lin[1], Jun Yu[1], Xiaoyang Guo[1], Cangtao Zhou[1], Shuangchen Ruan[2]
[1]College of Engineering Physics, Shenzhen Technology University, [2]Sino-German College of Intelligent Manufacturing, Shenzhen Technology University

A compact and robust all-fiber Michelson interferometer with a new phase retrieval method is proposed for dispersion measurements of CFBG. Benefit from the state-of-the-art OSA, high accuracy and large range measurements are achieved.

ALPS <Room 413>

ALPS13-02 10:30

THz-driven electron emission and applications
Tobias Olaf Buchmann, Matej Sebek, Simon Jappe Lange, Peter Uhd Jepsen
DTU Electro, Technical Universty Denmark

We present a THz detection method based on vacuum electronics and THz-driven electron field and thermionic emission. This technique offers detection and imaging capabilities in industrial and research domains with less complexity than conventional methods.

ALPS13-03 10:45

Observation of carrier accumulation effects with terahertz wave in a GaAs/AlAs multiple quantum well towards ultrafast optical switch applications
Osamu Kojima, Ayumu Takamatsu
Chiba Institute of Technology

We report the terahertz absorption spectra under the continuous-wave laser-excitation in a slightly strained quantum well. It was an advantage for the ultrafast-optical-switch application that the remarkable increase of the absorption was not observed.

ALPS13-04 11:00 ***Invited***

Terahertz Optical Rectification and Second-Harmonic Generation at the Surface of Nonlinear Crystals
Mathias Hedegaard Kristensen[1], Esben Skovsen[1], Emilie Hérault[2], Jean-Louis Coutaz[1,2]
[1]Aalborg University, [2]Univ. Savoie Mont Blanc

We study terahertz generation via optical rectification in reflection, both theoretically and experimentally. Then, we present a new methodology to detect the weak and possibly very broadband terahertz signal simultaneously with the reflected second-harmonic generation.

----- Lunch 11:30-14:00 -----

ALPS <Room 511+512>

ALPS15-02 10:45

Improvement of efficiency of walk-off compensated β-BaB_2O_4 using room-temperature bonding
Shion Naito, Tomoya Tanaka, Ichiro Shoji
Chuo University

We found that only one of four manufacturers could fabricate β-BaB_2O_4 plates with small deviations from the phase-matching angle. Walk-off compensating structures using these plates improved the wavelength-conversion efficiencies.

ALPS15-03 11:00

Influence of thermal treatment on light scattering centers in $CsLiB_6O_{10}$ crystal
Yoshihiro Kataoka[1], Yuto Matsumi[1], Ryota Murai[2], Yoshinori Takahashi[2], Hideo Takazawa[1], Shigeyoshi Usami[1], Masayuki Imanishi[1], Mihoko Maruyama[1], Yusuke Mori[1,2], Masashi Yoshimura[2,3]
[1]Graduate School of Engineering, Osaka University, [2]SOSHO CHOKO Inc., [3]Institute of Laser Engineering, Osaka University

Defect-related scattering centers in the nonlinear optical crystal CLBO were remarkably generated after thermal treatment. We also found that the generated scatterings in the crystal became less prominent at room temperature as the time passed.

ALPS15-04 11:15

Second-Harmonic Generation in Heteroepitaxially-Grown OP-$GaAs_{0.75}P_{0.25}$
Li Wang[1], Shivashankar R Vangala[2], Stefan Popien[3], Marcus Beutler[3], James Matthew Mann[2], Vladimir L Tassev[2], Edlef Büttner[3], Valentin Petrov[1]
[1]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [2]Air Force Research Laboratory, [3]APE Angewandte Physik und Elektronik GmbH

Second-harmonic generation using femtosecond pulses at 5.5 μm with a repetition rate of 80 MHz is demonstrated in orientation-patterned $GaAs_{0.75}P_{0.25}$ grown by hydride vapor phase epitaxy on a GaAs template.

ALPS15-05 11:30

Linear Thermal Expansion of $Ba_2Ga_8GeS_{16}$
Jonathan Goldstein[2], Michael Susner[2], Ryan Siebenaller[2,3], Shekhar Guha[2], Kentaro Miyata[4], Ginka Exner[5], Valentin Petrov[1]
[1]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [2]Air Force Research Laboratory, [3]The Ohio State University, [4]RIKEN, [5]Plovdiv University Paisii Hilendarski

The thermal expansion coefficients of the hexagonal nonlinear optical crystal $Ba_2Ga_8GeS_{16}$ and their temperature dependence are studied.

HEDS <Room 311+312>

[HEDS2] 10:35-11:40
Collisionless Shock 2
Chair: Hye-Sook Park
LLNL

HEDS2-01 10:35 ***Invited***

Turbulence mediated electron acceleration in laser produced collisionless shock
Bin Qiao[1], Xianxu Jin[1], Zhonghai Zhao[1], Jianqiang Zhu[2], Xiantu He[1]
[1]Peking University, [2]National Laboratory on High Power Laser and Physics, CAS

Astrophysical collisionless shock is one of the most powerful particle accelerators in the Universe, originating from the interaction between supersonic plasma flows and the background media that are typically in turbulent states. In this talk, I shall report our recent experimental results of the interactions between laser-produced collisionless shock and plasma turbulence on Shenguan-II laser facility, where electron fermi accelerations are observed.

HEDS2-02 11:00 ***Invited***

Diamagnetic plasmoid formation in super-Alfvénic, quasi-perpendicular expansion of laser-produced plasma into magnetized ambient plasma at high repetition rates
Robert Dorst[1], A. Le[2], C. G. Constantin[1], J. J. Pilgram[1], D. Larson[3], D. B. Schaeffer[1], S. Vincena[1], S. K. P. Tripathi[1], M. Cowee[2], C. Niemann[1]
[1]University of California - Los Angeles, [2]Los Alamos National Laboratory, [3]Lawrence Livermore National Laboratory

We present two-dimensional mapping of a super-Alfvénic ($M_A > 1$) carbon, laser produced plasma (LPP) as it expands into a preformed, magnetized helium plasma. The formation and propagation of a diamagnetic plasmoid is observed in the ambient plasma that separates a relatively large distance (~0.5 di) from the bulk diamagnetic cavity (~di).

HEDS2-03 11:25

Proton acceleration in a high-intensity laser-driven collisionless shock
Youichi Sakawa
Osaka University

Recently, high-intensity laser-driven collisionless electrostatic shock ion acceleration is drawing attention. In this scheme, upstream ions of the shock are reflected and accelerated in by the shock potential. In this talk, collisionless electrostatic shock formation and ion acceleration in a near-critical density multi-component plasma are investgated both in the 2D particle-in-cell simulation and experiments.

----- Lunch 11:40-13:15 -----

Oral, Tuesday, 23 April AM

ICNN <Room 414+415>

----- Coffee Break 10:30-10:45 -----

[ICNN5] 10:45-11:45
Session 4
Chair: Wakana Kubo
Tokyo University of Agriculture and Technology

ICNN5-01 10:45

Silicon photonics-based laser Doppler vibrometer array for non-contact photoacoustic imaging

Yanlu Li, Emiel Dieussaert, Mohammadamin Ghomashi, Roel Baets
Ghent University - imec

We report a silicon photonics-based laser Doppler vibrometer array that enables non-contact photoacoustic imaging and eliminates contamination risks. The photonics design is explained and an experimental demonstration on a silicone phantom is explained.

ICNN5-02 11:00

Absorption Enhancement of 2D Transition Metal Dichalcogenides on Silicon Metasurface by Degenerate Critical Coupling

Dingwei Chen[1], Junichi Takahara[1,2]
[1]Graduate School of Engineering, Osaka University, [2]Photonics Center, Graduate School of Engineering, Osaka University

We realized a dielectric-based Si metasurface platform to accomplish strong light absorption of 2D Transition Metal Dichalcogenides. An absorption enhancement of WS_2 on metasurface is achieved by about 15.5 times based on degenerate critical coupling.

ICNN5-03 11:15

Exploring Dispersion Characteristics in Airy Beam Metasurfaces

Bo-Wei Huang[1], Cheng Hung Chu[2], Kuang-Yuh Huang[1,4], Yuan Luo[2,3,5,6]
[1]Department of Mechanical Engineering, National Taiwan University, [2]Yong-Lin Institute of Health, National Taiwan University, [3]Institute of Medical Devices and Imaging System, National Taiwan University, [4]Graduate School of Advanced Technology, National Taiwan University, [5]Institute of Biomedical Engineering, National Taiwan University, [6]Program for Precision Health and Intelligent Medicine, National Taiwan University

In this work, we employed finite element method electromagnetic wave simulation software to analyze the intensity distribution of Airy beam metasurfaces at various wavelengths, providing a comprehensive exploration of the dispersion mechanisms in these metasurfaces.

ICNN5-04 11:30

Radial Transfer Matrix Model for Free-Space Emission Optimization

Stefan Appel, Viviana Villafane, Jonathan J. Finley, Kai Müller
Walter Schottky Institute, Technical University Munich

We propose and demonstrate a new kind of transfer matrix model to simulate the free-space emission of radial scattering rings out of a planar waveguide. Benchmarks show a 98% overlap with results from FDTD while reducing simulation time by two orders of magnitude. We exploit the speed advantage to optimize a 10-ring circular bragg grating for Gaussian emission from an embedded dipole.

LDC <Room 301>

----- Coffee Break 10:45-11:15 -----

[LDC2] 11:15-12:00
Keynote 2
Chair: Tetsuya Yagi
Nichia Corporation

LDC2-01 11:15

Laser TV: Hisense's Technology and Strategy

Xianrong Liu[1], Yuling Gao[1], Weidong Liu[2], Junichi Ohsako[3], Qiang Zhong[1], Youliang Tian[1]
[1]Hisense Laser Display Co., Ltd., [2]Hisense Visual Technology Co., Ltd., [3]TVS REGZA Corporation

Hisense has been involved in laser display since 2007. This article introduced Hisense's work in technology research and product development. Based on Laser TV, Hisense expands to smart projectors, commercial projectors, and vehicle display. Hisense regards laser display as the most dynamic and innovative opportunity. This article also gives a brief introduction to Hisense's layout in display.

LSSE <Room 316>

----- Coffee Break 10:30-11:00 -----

[LSSE2] 11:00-12:00
Carbon-Neutral 2
Chair: Seigo Ito
Univ. Hyoga

LSSE2-01 11:00 ***Invited***

Multiple options for energy storage by hydrogen storage material

Tessui Nakagawa
Univ. Ryukyus

We will discuss three hydrogen storage materials, which are ammonia, ammonia borane, and hydrogen storage alloys. These materials are important for finding the effective ways of energy storage in the future.

LSSE2-02 11:30 ***Invited***

Operando Raman Spectroscopy of Electrochemical Processes

Boon Siang Jason Yeo
National University of Singapore

In this presentation, we shall share our work on using Raman spectroscopy to detect the intermediates formed during several electrochemical reactions, and to elucidate their reaction mechanisms. The reactions of interests include CO_2 reduction and hydrogen evolution.

OMC <Room 418>

[OMC2] 10:45-12:00
Student Session 2
Chairs: Hung-Chuan Hsu
National Taiwan University
Yusuke Minowa
Osaka University

OMC2-01 10:45 ***Invited***

Utilizing optical anti-reflection and electromagnetic vacuum field interference in two-dimensional space

Dongha Kim, Sanghyeok Park, Jaeyu Kim, Min-Kyo Seo
KAIST

We present nanophotonic platforms for engineering optical fields in two dimensions and their applications. Our work includes anti-reflection enhanced magneto-optic Kerr effect microscopy, quasi-particle-like optical vortex generation, and nanophotonic mirrors for tuning two-dimensional exciton dynamics.

OMC2-02 11:15

Direct imprint of optical skyrmions with topologically protected polarization textures in a material

Rihito Tamura[1], Praveen Kumar[2], A. Srinivasa Rao[1,3,4], Katsuhiko Miyamoto[1,3], Natalia M. Litchinitser[5], Takashige Omatsu[1,3]
[1]Chiba University, [2]Indian Institute of Technology Bhilai, [3]Molecular Chirality Research Center, [4]Institute for Advanced Academic Research, [5]Duke Univ

Optical skyrmions are considered as topologically protected quasiparticles of light which possess highly sophisticated polarization structures. We herein report on the first demonstration of direct imprint of 1st and 2nd optical skyrmions with topologically protected polarization textures in azopolymers. This demonstration highlights the exotic interaction between topologically protected quasiparticles of light and matter.

OMC2-03 11:30

Geometric structured modes with switchable orthogonal polarization by an Nd:YVO_4 laser in a concave-convex cavity

Wei-Ru Chen, Pi-Hui Tuan
National Chung Cheng University

Geometric modes with orthogonal polarization is created by a *c*-cut Nd:YVO_4 laser in a concave-convex resonator. By the gain crystal birefringence, the switching of orthogonal polarization is achieved by simply adjusting the cavity length.

Oral, Tuesday, 23 April AM

OPTM <Room 213>

OPTM3-04 10:00

Integrating deep learning and photonics for asset integrity monitoring in remote locations

Yong Ma[1], Oliverio Alvarez[2], Weichang Li[2], Damian Pablo San Roman Alerigi[1]
[1]EXPEC Advanced Research Center, Aramco, [2]Houston Research Center, Aramco Americas

Developed and tested a remote monitoring system for equipment integrity in isolated areas, combining visual, IR cameras, and LiDAR with minimal mechanics Software-based multimodal deep-learning handles sensor adjustments, processing multimodal imagery for precise equipment displacement and health analysis.

----- Coffee Break 10:15-10:45 -----

[OPTM4] 10:45-12:00
Session 4
Chairs: Zhang Song
Purdue University
Daisuke Kono
Kyoto University

OPTM4-01 10:45 ***Invited***

Light field microscopy with improved resolution in 3D

Shin Usuki[1], Reiji Yagi[2], Tadatoshi Sekine[2], Kenjiro Takai Miura[2], Takuma Sugi[3]
[1]Research Institute of Electronics, Shizuoka University, [2]Graduate School of Science and Technoloty, Shizuoka University, [3]Graduate School of Integrated Sciences for Life, Hiroshima University

In order to improve the resolution of the light field microscopy, the multi-frame super-resolution with sub-pixel image displacements, the focused-unfocused compound plenoptic system and the structured illumination microscopy were implemented.

OPTM4-02 11:15

A Basic Research on The Deep Seabed Classification Technology Using Laser Reflection Images with Different Wavelengths

Shojiro Ishibashi[1], Takamistu Okada[2], Yutaka Hasegawa[3]
[1]JAMSTEC / Japan Agency for Marine Earth Science and Techonlogy, [2]MEDS / Mitsubishi Electric Defense and Space Technologies Corp., [3]HPK / Hamamatsu Photonics K.K.

Two types of underwater laser scanners are being developed to generate seabed images using lasers of different two wavelengths. It is expected that the laser scanning images will be able to classify deep seabed.

OPTM4-03 11:30

Insepction of edge detection using spatial filtering

Jingwei Wang[1], Tatsuki Otsubo[1], Megumi Kuroiwa[2], Toshiaki Yasaka[1], Takanori Yazawa[1]
[1]Nagasaki University, [2]Em Laboratory Corporation

This study developed a method for detecting edge defects in straight punching blades and circular molding dies using spatial frequency filtering technology. This technique enables the high-speed and high-precision detection of minute defects, contributing to improved quality assurance and productivity in manufacturing.

SLPC <Room 416+417>

SLPC1-04 10:00

Additive Manufacturing Process of Conductive Bio-based Polymer Composites with Hybrid Filler System

Sasitorn Srisawadi, Siwaporn Srimongkol, Natsaporn Butsri, Panithi Wiroonpochit
National Science and Technology Development Agency

This study explores laser-based additive manufacturing (AM) of natural rubber (NR) latex. Conductive NR composites with conductive carbon black and few-layer graphene were formulated, enhancing electrical conductivity. The resulting bio-based polymer composites with a hybrid filler system showcased electromechanical properties, establishing the material as a potential strain sensor.

SLPC1-05 10:15

Fabrication of Periodic Axial Air Gap Structures using Laser Powder Bed Fusion with Wobble-Based Scanning Strategy

Fu-Kai Chuang[1], Chung-Wei Cheng[1], An-Chen Lee[1], Tsung-Wei Chang[2], Mi-Ching Tsai[2], Huang-Wei Chang[3]
[1]National Yang Ming Chiao Tung University, [2]National Cheng Kung University, [3]National Chung Cheng University

This study utilized the self-developed LPBF system, employing soft magnetic material Fe-79Ni-4Mo powder (PC-Permalloy). A wobble-based scanning strategy with a fixed wing overlap rate was implemented for large swing width scanning.

----- Coffee Break 10:30-10:45 -----

[SLPC2] 10:45-12:00
Micro Nano Processing 1
Chairs: Yoshio Hayasaki
Utsunomiya University
Masaki Hashida
Tokai University

SLPC2-01 10:45 ***Invited***

Laser-Generated Nanomaterials for Gas Sensing

Sergei A. Kulinich
Tokai University, Research Institute of Science and Technology

The talk will deal with nanomaterials produced by laser ablation in liquid field and used for gas sensing.

SLPC2-02 11:15 ***Invited***

Creation of NV centers by ultrashort laser irradiation

Norikazu Mizuochi[1,2]
[1]Institute for Chemical Research, Kyoto University, [2]Center for Spintronics Research Network, Kyoto University

The NV center in diamond has been attracting attention from the viewpoint of applying ultrasensitive sensors and quantum information devices such as single photon sources because of their outstanding photostability. Here, we demonstrate the creation of NV centers in a wide region such as a millimeter-sized region using only an intense single femtosecond laser pulse irradiation.

XOPT <Room 313+314>

----- Coffee Break 10:20-10:45 -----

[XOPT2] 10:45-12:00
Facility1
Chair: Harald Sinn
European XFEL

XOPT2-01 10:45 ***Invited***

Novel X-ray optics for SPring-8-II

Taito Osaka
RIKEN SPring-8 Center

I will overview our activities in the development of X-ray optics for SPring-8-II, a forthcoming 6-GeV diffraction-limited storage ring, which imposes severe requirements on the X-ray optics to unleash its brilliant potential.

XOPT2-02 11:15 ***Invited***

Manipulating Synchrotron X-ray Pulses with Picosecond Resolution

Jin Wang, Jinxing Jiang, Jian Zhou, Donald Walko, David Czaplewski
Argonne National Laboratory

We develop microelectromechanical devices for ultrafast and dynamic X-ray optics as a picosecond synchrotron pulse shaper that shapes the hard X-ray pulses at individual beamlines beyond the synchrotron pulse limits.

NOTE

Oral, Tuesday, 23 April PM

ALPS <Room 303>

ALPS10-04 11:45

Development of sigle-shot measurement of refractive indices using low-coherence interferometry

Hiroki Morita[1], Ryo Kurihara[1], Kento Kowa[2], Yoshitomo Nakashima[2], Hiroyuki Kowa[2], Naoji Oya[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]TRIOPITCS Japan

We have developed the low-coherence single-shot interferometry to measure the group refractive indices of thin glass samples. In this method, two interference fringes can be observed on a single image. The group refractive index can be obtained from the interval of both fringes. The results were in good agreement with the minimum deviation method. Our method would contribute to digital transformation technologies such as AR/VR and aerial display devices.

----- Lunch 12:00-13:45 -----

[ALPS11] 13:45-15:15
Novel solid state / fiber / diode lasers and applications (3)
Chair: Shigeki Tokita
Kyoto University

ALPS11-01 13:45 ***Invited***

Terawatt-level 2.4-μm pulses based on Cr:ZnS chirped - pulse amplification

Xiaoming Lu[1], Xinliang Wang[1], Jintai Fan[2], Rongjie Xu[1], Junchi Chen[1], Long Zhang[2,3], Yunxin Leng[1,3]
[1]State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, [2]Key Laboratory of Materials for High-Power Laser, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, [3]Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences

We have developed a 1-Hz, 0.95-TW, Cr:ZnS-based CPA laser system. We combined Cr:ZnS elements to absorb more pump energy and used the ink-cladding technique to suppress the transverse parasitic lasing inside the Cr:ZnS elements.

ALPS11-02 14:15

Diode-pumped 88-fs mode-locked Tm,Ho:CLNGG laser based on GaSb-SESAM

Anna Suzuki[1], Yicheng Wang[1], Sergei Tomilov[1], Zhongben Pan[2], Clara Jody Saraceno[1]
[1]Ruhr-University Bochum, [2]Key Laboratory of Laser and Infrared System of Ministry of Education

We present a SESAM mode-locked Tm,Ho:CLNGG laser pumped by an affordable laser diode. We demonstrate the first sub-100-fs diode-pumped mode-locked laser in the 2-μm wavelength range.

ALPS11-03 14:30

Development of OCT in 2-μm spectral region by using an all-fiberized ultrashort Tm-Ho co-doped fiber laser

Rongjie Zhang, Futa Osaki, Shotaro Kitajima, Junya Yamamoto, Norihiko Nishizawa
NAGOYA University

We generated supercontinuum in 2-μm region by utilizing ultrashort pulse Tm-Ho co-doped fiber laser. Supercontinuum was applied as the light source of time-domain optical coherence tomography system, and cross-sectional imaging of human finger was demonstrated.

ALPS <Room 413>

[ALPS14] 14:00-15:45
Terahertz devices, nonlinear optics and applications (2)
Chair: Shinichi Watanabe
Keio Univ.

ALPS14-01 14:00 ***Invited***

Milliwatt-class terahertz signal sources using resonant tunneling diodes

Safumi Suzuki
Tokyo Institute of Technology

Resonant tunneling diodes (RTDs) are one of the promising candidates for THz signal sources. Recently, a high output power of 11.8 mW at 450 GHz was achieved by a 36-element coherent array. Besides, attempts to increase in the output power of a single oscillator have been conducted. In this presentation, the recent studies for high-power RTD THz oscillators will be introduced.

ALPS14-02 14:30

Single-pixel spectroscopic imaging through packaging materials using terahertz waves

Tomoki Tanetani, Kento Maenaka, Sota Mine, Kodo Kawase, Kousuke Murate
Nagoya University

Single-pixel spectroscopic imaging through packaging materials was performed using a terahertz parametric generator. We obtained spatial patterns of reagents using the system.

ALPS <Room 511+512>

----- Lunch 11:45-14:00 -----

[ALPS16] 14:00-15:15
High average power lasers and applications (1)
Chair: Hiroki Tanaka
Leibniz Institute for Crystal Growth

ALPS16-01 14:00 ***Invited***

Pulse compression of a thin-disk oscillator to GW-level peak power with nonlinear multipass cells

Semyon Goncharov[1], Kilian Fritsch[2], Oleg Pronin[1]
[1]Helmut Schmidt Universtität, [2]n2-Photonics

We report nonlinear broadening and pulse compression in two consecutive multipass cells based on dielectric mirrors. The 120 fs pulses at 14 MHz containing 12.8 μJ were compressed to 7.2 fs with 146 W average power.

ALPS16-02 14:30

Demonstration of Stable Long-Term 10 J, 100 Hz Operation of a Nanosecond Pulsed DPSSL

Luke McHugh[1], Mariastefania De Vido[1], Gary Quinn[1,2], Danielle Clarke[1,2], Paul Mason[1], Jacob Spear[1], Jodie Smith[1], Martin Divoky[3], Jan Pilar[3], Ondrej Denk[3], Thomas Butcher[1], Chris Edwards[1], Tomas Mocek[3], John Collier[1]
[1]Central Laser Facility, STFC Rutherford Appleton Laboratory, [2]Institute of Photonics and Quantum Sciences, Heriot-Watt University, [3]HiLASE Centre, Institute of Physics of the Czech Academy of Sciences

We report on the successful stable long-term operation of a nanosecond diode-pumped solid-state laser (DPSSL). DiPOLE-100Hz ran at 10 J, 100 Hz with an optical-to-optical efficiency of 25.4% and 1% rms energy stability.

HEDS <Room 311+312>

[HEDS3] 13:15-15:05
Collisionless Shock 3
Chair: Gianluca Gregori
University of Oxford

HEDS3-01 13:15 ***Invited***

Particle Acceleration and Energy Partition in Turbulent Collisionless Shocks

Frederico Fiúza
Physics at Instituto Superior Técnico

Shock waves produced by violent interactions of supersonic plasma flows with the interstellar medium or planetary magnetospheres are observed to heat the plasma, amplify magnetic fields, and accelerate electrons and protons to relativistic speeds. However, the exact mechanisms that control energy partition in these shocks remain a mystery.

HEDS3-02 13:40 ***Invited***

High-power laser experiment forming supercritical magnetized collisionless shocks

Ryo Yamazaki
Aoyama Gakuin University

We present an experimental method to form quasiperpendicular supercritical magnetized collisionless shock in a magnetized uniform plasma at rest.

HEDS3-03 14:05

Formation of Magnetized Bow Shocks with High-Power Laser: Dependence of Their Structure on Magnetic Field Orientation

Shuta J Tanaka[1], Yasuhiro Kuramitsu[2], Kentaro Sakai[3], Kenji Toma[4], Jin Matsumoto[5], Munehito Shoda[6], Kazuyoshi Tanaka[1], Ryo Yamazaki[1], Taichi Morita[7], Shogo Isayama[7], Taichi Takezaki[8], Takayoshi Sano[9], Kaori Obayashi[1], Juri Shiota[1], Yuna Kidokoro[1], Shoma Yakura[1], Shunsuke Suzuki[9], Yuki Abe[2], Kiyochika Kuramoto[2], Fuka Nikaido[2], Takumi Minami[2], Adam D Dearling[9], Kosuke Maeda[9], Yuto Suzuki[9], Masahiro Hanano[9], Shuichi Matsukiyo[7], Kentaro Tomita[10], Satoshi Kodaira[11], Yuji Fukuda[12], Youichi Sakawa[9]
[1]Aoyama Gakuin University, [2]Osaka University, [3]National Institute for Fusion Science, [4]Tohoku University, [5]Keio University, [6]University of Tokyo, [7]Kyushu University, [8]University of Toyama, [9]Osaka University, [10]Hokkaido University, [11]National Institute of Radiological Sciences, [12]Kansai Photon Science Institute

The high-power laser experiment of magnetized bow shock formation is introduced. The experiment was conducted at Gekko XII of Osaka University in 2022. We observed the self-emission from the plasma heated by the bow shock.

HEDS3-04 14:20

Particle Acceleration in a Relativistic Weibel-Mediated Shock Propagating to Electron-Proton-Helium Plasmas with Solar Abundance

Sara Tomita[1], Yutaka Ohira[2]
[1]Tohoku University, [2]The University of Tokyo

The observed chemical abundance of the cosmic rays shows enhancements than solar abundances (Batisita et al. 2019). We perform the first PIC simulation of a relativistic collisionless shock propagating to the electron-proton-helium plasma with solar abundance. We found that the number of energetic helium ions is larger than that of the protons. We can also explain their acceleration fraction analytically.

Oral, Tuesday, 23 April PM

ICNN <Room 414+415>

----- Lunch 11:45-13:30 -----

[ICNN6] 13:30-15:00
Session 5
Chair: Koichi Okamoto
Osaka Metropolitan University

ICNN6-01 13:30 *Invited*

Controlling the optical vortex beam emission from a photonic chip

Xu Fang
University of Southampton

We propose and numerical demonstrate several methods for generating optical vortex beams from planar, photonic chip-based devices. The creation of high-value topological charges and incident direction-based tuning are observed in methods that utilize integrated metasurfaces.

ICNN6-02 14:00 *Invited*

Study on beam trajectories in distorted photonic crystals

Kyoko Kitamura[1,2], Yushin Karasawa[2], Yuki Kawamoto[1,2], Ayano Onishi[1,2]
[1]TOHOKU University, [2]Kyoto Institute of Technology

We present the distorted photonic crystals and their peculiar optical beam trajectories.

ICNN6-03 14:30

Ultrastrong Coupling in a hybrid Al/Cd_3As_2 Terahertz Photonic Structure

Zizwe Chase, Tenyu Aikawa, Riad Yahiaoui, Pai-Yen Chen, Thomas Searles
University of Illinois at Chicago

Ultrastrong coupling achieved in an optical Fabry-Perot cavity consisting of a quartz slab sandwiched between an Aluminum ribbon and Cd_3As_2 grating for quantum information technology applications.

LDC <Room 301>

----- Lunch 12:00-13:00 -----

[LDC3] 13:00-15:15
Light sources and components 1
Chair: Tatsushi Hamaguchi
Mie University

LDC3-01 13:00 *Invited*

Continuous-wave operation of long cavity III-nitride vertical-cavity surface-emitting lasers utilizing a topside dielectric curved mirror

Nathan Christopher Palmquist, Stephen Gee, Srinivas Gandrothula, Xianqing Li, Steven P. Denbaars, Shuji Nakamura
University of California, Santa Barbara

We report our recent results of a GaN VCSEL with a topside dielectric concave mirror. CW fundamental transverse mode operation is demonstrated and analyzed for current apertures up to 11μm. Alternative methods of shaping the transverse mode are discussed in this talk.

LDC3-02 13:30 *Invited*

Fabrication of Stacked RGB Monolithic GaInN-based μLED Arrays with Tunnel Junctions and Challenges for display Applications

Motoaki Iwaya[1], Tatsunari Saito[1], Yoshinobu Suehiro[1], Tetsuya Takeuchi[1], Satoshi Kamiyama[1], Daisuke Iida[2], Kazuhiro Ohkawa[2]
[1]Meijo University, [2]King Abdullah University of Science and Technology (KAUST)

We have proposed a method of forming tunnel junction layers between RGB devices by crystal growth and electrodes on etched n-type layers, and fabricated stacked monolithic RGB full-color μLED arrays.

LDC3-03 14:00

From AR Glasses to Mainstream Display Projection — Recent Advances in red, green and blue LEDs and Laser Solutions

Stephan Haneder[1], Benjamin Schulz[1], Martin Unterburger[1], Florian Rommen[1], Vicknes R. Krishnan[2], Tsutomo Yazaki[3]
[1]ams OSRAM International GmbH, [2]ams OSRAM Penang, [3]ams OSRAM Japan Ltd

Over the recent years solid state light sources for projection displays have shown tremendous progress. Their application usage is ranging from low luminance near to eye projection for augmented reality glasses to high brightness mainstream projectors.

LDC3-04 14:30

Coupling wave optics and human perception simulations to optimize an RGB OLED display

Charly Meyer, Sabrina Niemeyer, Sandra Gely, Taylor Robertson, Federico Duque Gomez, Kam Chow, Edward Tong, James Pond
Ansys

We propose an optical simulation workflow for RGB OLED displays that combines photonic simulation of the pixel nanostructure with photometric simulation of the display. We run a multi-objective optimization for achieving high performance across competing metrics at the pixel nanoscale then simulate the display with a Human Vision model in an illumination scene.

LSSE <Room 316>

----- Lunch 12:00-13:00 -----

[LSSE3] 13:00-15:00
Carbon-Neutral 3
Chair: Tessui Nakagawa
Univ. Ryukyus

LSSE3-01 13:00 *Invited*

Porous Carbons using Metal-Organic Frameworks (MOFs) as Precursors for High Surface Area

Hiroshi Matsutaka[1,2], Aya Kashifuku[1], Manabu Inukai[1], Takaaki Orii[1], Takeharu Yoshii[2], Hirotomo Nishihara[2], Naoki Uchiyama[1,3], Daigo Miyajima[1,4]
[1]RIKEN, [2]Tohoku University, [3]Atsumitec Co., Ltd., [4]The Chinese University of Hong Kong

MOF-derived porous carbons have attracted interest in potential applications such as gas storage because of their large surface area and stability. Here, we report a new perspective on synthesizing the porous carbons with good reproducibility.

LSSE3-02 13:30 *Invited*

Strong light-matter interactions at a nanometric metal tip for molecular sensing and control

Taka-aki Yano[1,2]
[1]Tokushima University, [2]RIKEN

We present strong light-matter interactions at a sharp metallic tip which enables us to demonstrate not only nanoscale sensing but also nanoscale control of molecular reactions.

LSSE3-03 14:00 *Invited*

The origin of magnetization-caused increment in water oxidation

Zhichuan J. Xu
Nanyang Technological University

Using external magnetic fields to enhance the oxygen evolution reaction (OER) on magnetic catalysts prompts questions. While spin-polarization in a single magnetic domain was theorized to facilitate triplet dioxygen production, the origin of enhancement remains unknown. Our findings clarify the source of OER improvement under magnetization and explain pH-dependent enhancement, filling a crucial gap in understanding magnetic field-enhanced OER.

LSSE3-04 14:30 *Invited*

Solar to Hydrogen Conversion using 2D-g-C_3N_4/Cu_2O Nanowires Heterojunction Photocathode

Hyojung Bae[1,2], Pratik Mane[3], Vishal Burungale[2], Kailash Chandra Bhamu[4], Katsushi Fujii[5], Jin-Woo Ju[1], Jun-Seok Ha[2,3]
[1]Photonics Energy Materials Research Center Korea Photonics Technology Institute, [2]Optoelectronics Convergence Research Center Chonnam National University, [3]School of Chemical Engineering Chonnam National University, [4]School of Chemical Engineering University of Ulsan, [5]Photonics Control Technology Team RIKEN Center for Advanced Photonics

Considering their outstanding cost-to-efficiency ratios, Cuprous oxide (Cu_2O) is emerging as an ideal photocathode. However, fast charge recombination and low resistance to photo-corrosion limit its practical applications. So, in this conference, we will introduce a graphitic carbon nitride (g-C_3N_4)/2D-Cu_2O nanowires (NWs) with core-shell heterojunction.

OMC <Room 418>

OMC2-04 11:45

Advancing Metasurfaces: Harnessing Integrated-resonant Units for Boosting Phase Compensation and Efficiency

Rong Lin[1], Jin Yao[1], Mu Ku Chen[1,2,3], Din Ping Tsai[1,2,3]
[1]Department of Electrical Engineering, City University of Hong Kong, [2]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [3]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong

Integrated-resonant units (IRUs) enhance phase compensation and efficiency of metasurfaces, enabling advanced optics in visible and microwave spectra.

----- Lunch 12:00-13:30 -----

[OMC3] 13:30-15:05
Session 1
Chair: Takashige Omatsu
Chiba University

OMC3-OP 13:30

Opening Remarks

Takashige Omatsu
Chiba University

OMC3-01 13:35

Laguerre-Gaussian mode laser generated directly from laser cavity with spherical aberration

Quan Sheng[1], Tianchang Liu[1], Jingni Geng[1], Yuanyuan Ma[2], Shijie Fu[1], Wei Shi[1], Jianquan Yao[1], Takashige Omatsu[2], David James Spence[3]
[1]Tianjin University, [2]Chiba University, [3]Macquarie University

We present our approach of high-order LG mode laser based on laser cavity with spherical aberration. $LG_{0,\pm m}$ mode output with angular indices *m* selectable from 1 to up to 317 have been obtained.

OMC3-02 14:05

Whispering gallery mode resonance from self-assembled microspheres with twisted bipolar topology

Yohei Yamamoto, Osamu Oki, Sota Nakayama, Hiroshi Yamagishi
University of Tsukuba

We show whispering gallery mode (WGM) resonance from chiral polymer microspheres with twisted bipolar topology, where WGM photoluminescence appears at the selective positions due to the swirl arrangement of the polymer main chains.

OMC3-03 14:20

Polarization holography for efficient generation of vector-vortex beams

Boaz Jessie Jackin[1], Sumit Kumar Singh[2], Kenji Kinashi[3], Naoto Tsutsumi[3], Wataru Sakai[3]
[1]Materials Innovation Laboratory, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku Kyoto, 606-8585 Japan, [2]Graduate School of Science and Technology, Kyoto Institute of Technology, Sakyo-ku, Kyoto, 606-8585, Japan, [3]Faculty of Materials Science and Engineering, Kyoto Institute of Technology, Matsugasaki, Sakyo-ku Kyoto, 606-8585 Japan

We propose a simple, scalable and compact device for efficient generation of multiple vector-vortex beams. The device is a polarization hologram fabricated on a azo functionalized copolymer, using a simple interferometric arrangement. Simply illuminating the fabricated hologram with a collimated beam is enough to generate multiple vector-vortex beams, without the need for any additional optics.

Oral, Tuesday, 23 April PM

OPTM <Room 213>

OPTM4-04 11:45

Human Pose Estimation from Noisy Point Cloud Using Unsupervised Learning

Chaitali Bhattacharyya, Sungho Kim
Yeungnam University

3D computer vision, vital in industries like animation and healthcare, faces challenges with noisy point cloud data from depth cameras, affecting accuracy in human pose estimation. Our paper presents a novel method to accurately estimate poses from such data, enhancing applications in various fields. This breakthrough addresses key issues in 3D pose analysis, offering a reliable solution for diverse industries.

----- Lunch 12:00-13:45 -----

[OPTM5] 13:45-15:00
Session 5
Chairs: Matthias Eifler
IU International University of Applied Sciences
Shin Usuki
Shizuoka University

OPTM5-01 13:45 ***Invited***

Some Recent Work on Large Depth of Field 3D Microscopic Imaging Using Electrical Tunable Lens

Zhang Song, Liming Chen
Purdue University

TBD

OWPT <Room 304>

[OWPT1] 13:45-15:00
Session 1
Chairs: Tomoyuki Miyamoto
Tokyo Tech.
Motoharu Matsuura
Univ. Electro-Communications

OWPT-OP 13:45

Opening Remarks

Tomoyuki Miyamoto
Tokyo Tech.

OWPT1-01 14:00 ***Plenary***

Power over Fiber as enabler in 6G optical fronthaul

Carmen Vázquez, Rubén Altuna, Javier Barco, David Sánchez-Montero
Universidad Carlos III de Madrid

Increasing proposals of using power over fiber (PoF) integrated in optical fronthauling is reviewed along with a discussion of future room envisioned in 6G ecosystem to provide access to everywhere and to be aligned with targeted Key Performance Indicators. Including novel monitoring techniques for safety operation, PoF pooling and space trials.

SLPC <Room 416+417>

SLPC2-03 11:45

Effect of laser irradiation on tungsten-based materials for nuclear fusion applications

Haotian Yang[1], Ryo Yasuhara[1,2], Hiroyuki Noto[1,2], Daisuke Nagata[2], Masayuki Tokitani[1,2], Haruki Kawaguchi[1,2], Chihiro Suzuki[1,2], Reina Miyagawa[3], Hiyori Uehara[1,2]
[1]The Graduate University for Advanced Studies, [2]National Institute for Fusion Science, [3]Nagoya Institute of Technology

A nanosecond Nd:YAG laser was employed to investigate the laser processing properties of W-based materials and evaluate the impact of laser irradiation on the grain structure and mechanical properties of the material.

----- Lunch 12:00-13:15 -----

[SLPC3] 13:15-15:00
Ultrashort Pulsed Laser Processing
Chairs: Masaki Hashida
Tokai University
Masahito Katto
University of Miyazaki

SLPC3-01 13:15 ***Invited***

Ultra-Short Pulsed Laser Ablation of Metals with Burst Pulses: Concepts, Opportunities and Misconceptions

Beat Neuenschwander[1], Stefan M. Remund[1], Daniel J. Foerster[2]
[1]Institute for Applied Laser, Photonics and Surface technologies ALPS, Bern University of Applied Sciences, Switzerland, [2]LightPulse LASER PRECISION, Germany

The idea of burst pulses is to divide a high pulse energy into several individual pulses that follow each other at short intervals (a few 10 ns up to a few 100 ps). Thus, each individual pulse in the burst gets closer to the optimal fluence associated with a maximal conversion of the pulse energy. Compared to a process with high-energy single pulses, the process with burst pulses becomes significantly more efficient at the same laser repetition rate.

SLPC3-02 13:45

Fabrication of diffraction gratings in glass and in-process monitoring of its diffraction beam

Yuta Nakamura, Satoshi Hasegawa, Yoshio Hayasaki
Utsunomiya University

We developed a holographic laser processing machine with the performance monitoring of a target fabrication. The machine also had a rotating stage for the change of the beam parameters over a long period of time.

SLPC3-03 14:00

Laser processing of transparent materials for laser wakefield electron accelerators

Gediminas Raciukaitis, Migle Mackeviciute, Juozas Dudutis, Valdemar Stankevič, Mehdi Abedi-Varaki, Valdas Girdauskas, Paulius Gečys, Vidmantas Tomkus
FTMC - Center for Physical Sciences and Technology

We utilise a combined laser micromachining technology to manufacture complex gas nozzles to tailor the plasma target for laser wakefield accelerators. A two-stage supersonic nozzle was optimised for the injection and acceleration of electrons using a Bessel-Gauss driving beam. The first nozzle is used for the ionisation injection of electrons. The nozzle is for the LWFA acceleration of electrons.

XOPT <Room 313+314>

XOPT2-03 11:45

The current status of X-ray Micro and Nano-Tomography endsation at Taiwan Photon Source

Gung-Chian Yin, Chien-Yu Lee, Bo-Yi Chen, Yen-Fang Song, Ming-Ying Hsu, Ying-Shuo Tseng, Shih-Ting Lo, Hsiu-Chien Chan
NSRRC

This presentation will report to you the commission results status of TPS 31A1 Mirco-CT, projection X-ray microscope (PXM) station, and TPS31A2 Nano-CT, up to the end of 2023 and early 2024. The PXM can provide high-speed computed tomography, fast X-ray imaging, high throughput, and high-energy resolution experiments, while Nano-CT is under commission. The design parameters and most updated results will be reported in this presentation.

----- Lunch 12:00-13:25 -----

[XOPT3] 13:25-14:55
Facility2 + Metrology
Chair: Diling Zhu
SLAC National Accelerator Laboratory

XOPT3-01 13:25 ***Invited***

Current and Near-Future Nanoscale X-ray Imaging Capabilities at NSLS-II

Yong Song Chu, Hanfei Yan, Xiaojing Huang, Ajith Pattammattel, Zirui Gao, Mingyuan Ge, Xianghui Xiao, Evgeny Nazaretski, Nathalie Bouet
National Synchrotron Light source II, Brookhaven National Laboratory

We present the current and near-future nanoscale x-ray imaging capabilites at NSLS-II. The presentation will include an overview of the new beamline development plan and the recent progress at NSLS-II.

XOPT3-02 13:55

A Beam-multiplexing Double Crystal Monochromator for LCLS-II-HE

Ying Chen, Rebecca Armenta, Robert Baker, Lin Zhang, Diling Zhu
SLAC National Accelerator Laboratory

In this presentation, I will introduce the optical design for a new beam multiplexing scheme planned at the LCLS-II HE for the XPP instrument by introducing transmissive diamond gratings beam splitters.

XOPT3-03 14:10

Deep learning based X-ray Wavefront Sensing methods for Synchrotron and Free Electron Laser

Zhi Qiao[1], Xianbo Shi[2], Yajun Tong[3], Huaidong Jiang[4]
[1]ShanghaiTech Unversity, [2]Argonne Natioonal Laboratory, [3]ShanghaiTech Unversity, [4]ShanghaiTech Unversity

X-ray wavefront sensing methods with high resolution and high speed are required for high repetition rate and high brightness synchrotron and free electron lasers. By combing the artificial intelligence with speckle tracking, we show that the deep learning based X-ray wavefront sensing method can achieve three orders of magnitude improvement in speed and provide competiable spatial resolution compared with the traditional methods.

NOTE

Oral, Tuesday, 23 April PM

ALPS <Room 303>

ALPS11-04 14:45

Repetition Rate Stability of a Mode-Locked Erbium-Doped Fiber Laser

Guoqi Ren, A. Amani Eilanlou, Yusuke Ito, Naohiko Sugita, Atsushi Iwasaki
The University of Tokyo

We report a 50.47 MHz, 1549.6 nm narrowband erbium-doped fiber laser oscillator with an unprecedented pulse energy of 140 pJ and only 312 Hz fluctuation of the repetition rate in 7 h of free-running operation.

ALPS11-05 15:00

Programable spectral peak generation from mode-locked Er-doped fiber laser with LCOS-SLM spectral filter

Shotaro Kitajima, Sakiko Kobata, Norihiko Nishizawa
Nagoya University

Mode-locked Er-doped fiber laser with an LCOS spectral filter inside the cavity was developed. Multiple spectral peaks generation and the consequent formation of burst pulses directly from the cavity were demonstrated.

----- Coffee Break 15:15-15:30 -----

[ALPS12] 15:30-17:00
Novel solid state / fiber / diode lasers and applications (4)
Chair: Anna Ono-Suzuki
Ruhr-Universität Bochum

ALPS12-01 15:30 ***Invited***

Attosecond Science with Intense Infrared Sources for Soft X-ray and Condensed Matter

Takayuki Kurihara[1], Tianqi Yang[1], Tomoya Mizuno[1], Nobuhisa Ishii[2], Takashige Fujiwara[3], Teruto Kanai[1], Jiro Itatani[1]
[1]The University of Tokyo, [2]Kansai Institute for Photon Science, National Institutes for Quantum Science and Technology, [3]Riken Center for Advanced Photonics, RIKEN

Phase-stable intense infrared sources are developed to produce soft x-ray attosecond pulses, and ultrafast transient absorption spectroscopy is demonstrated at 400 eV. Mid-infrared sources are also developed to study strong field-driven phenomena in condensed matter.

ALPS <Room 413>

ALPS14-03 14:45

Terahertz Spectroscopy for Distinguishing Calcium Oxalate Hydrates

Wangxuan Zhao[1], Verdad C. Agulto[1], Haruto Kobashi[1], Kosaku Kato[1], Mihoko Maruyama[1], Masae Takahashi[2], Yutaro Tanaka[1], Yusuke Mori[1], Masashi Yoshimura[1], Makoto Nakajima[1]
[1]Osaka University, [2]Tohoku University

Terahertz time-domain spectroscopy (THz-TDS) and Fourier transform infrared spectroscopy (FTIR) were employed to analyze calcium oxalate dihydrate and calcium oxalate monohydrate, which are the predominant components of kidney stones.

ALPS14-04 15:00

Ultrafast Detection of Pulse Profiles via Chirped-Pulse Up-Conversion

Ryo Tamaki[1,2], Miho Fukuoka[2], Isao Morohashi[3], Ikufumi Katayama[2]
[1]KISTEC, [2]Yokohama National University, [3]NICT

In this study, we demonstrate asynchronous ultrafast detection of pulse profiles at telecom wavelength via chirped-pulse up-conversion with dispersion compensation on a single-shot basis. Spectral interference in the conventional chirped-pulse spectroscopy could be reduced significantly.

ALPS14-05 15:15

LBO-based broadband visible NOPA pumped by Yb:KGW amplifier system

Ahmed Ramadan Ibrahim, Takayuki Kurihara, Teruto Kanai, Jiro Itatani
The Institute for Solid State Physics, The University of Tokyo, Japan

LiB_3O_5-based NOPA pumped by the third harmonic of a Yb:KGW laser system is constructed. The CEP stable output that covers from 570 to 830 nm with a pulse energy of 8 μJ is achieved.

ALPS14-06 15:30

Transmission experiment of a 300 GHz wave generated by using a soliton comb

Mantaro Imamura[1], Ayaka Yomoda[1], Koya Tanikawa[1], Soma Kogure[1], Ryo Sugano[1], Satoki Kawanishi[1], Shun Fujii[2], Takasumi Tanabe[1]
[1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, [2]Department of Physics, Faculty of Science and Technology, Keio University

We transmitted a 300 GHz signal generated by a soliton comb at 10 Gbit/s and demonstrated high-quality data transmission.

ALPS <Room 511+512>

ALPS16-03 14:45

Developing control method of acoustic and entropy wave in Gas-Based optics for laser machining

Yurina Michine, Hitoki Yoneda
University of Electro-Communications

Investigated control method of acoustic and entropy wave in gas-based optics for laser processing. Under specific condition, entropy wave persist, potentially enabling applications in modulating high-power CW fiber and pseudo-CW lasers.

ALPS16-04 15:00

Laser properties of Nd-doped fluorapatite transparent ceramics

Kazuya Takimoto[1,2], Hiroyasu Sone[1], Hiroaki Furuse[2]
[1]Kitami Institute of Technology, [2]National Institute for Materials Science

The laser oscillation in the 1.3 μm wavelength range using non-cubic neodymium-doped fluorapatite (FAP and S-FAP) ceramics are demonstrated. In addition, efficient operation at 1.0 μm was also studied.

----- Coffee Break 15:15-15:30 -----

[ALPS17] 15:30-16:30
High average power lasers and applications (2)
Chair: Hiroaki Furuse
NIMS

ALPS17-01 15:30 ***Invited***

Towards Terawatt-Level Intense Mid-Infrared Lasers Based on Fe:ZnSe Chirped Pulse Amplification

Shigeki Tokita[1], Daiki Okazaki[1], Tsuneto Kanai[1], Linpeng Yu[2], Ryo Yasuhara[2]
[1]Kyoto University, [2]National Institute for Fusion Science

We review advancements in mid-infrared Fe:ZnSe lasers, specifically at 4 μm, highlighting our approaches to increase the laser intensity. This work paves the way for breakthroughs in high-power mid-infrared laser applications.

HEDS <Room 311+312>

HEDS3-05 14:35

Electron Heating by Ion-Weibel Instability in the Presence of Finite Beam-Perpendicular Background Magnetic Field

Taiki Jikei[1], Takanobu Amano[1], Yosuke Matsumoto[2], Yasuhiro Kuramitsu[3]
[1]The University of Tokyo, [2]Chiba University, [3]Osaka University

We discuss the magnetic field amplification and electron heating by ion-Weibel instability. We present a novel dynamo-like amplification mechanism in the presence of a weak but finite background magnetic field. This scenario applies to high-Mach number astrophysical shocks such as supernova remnants.

HEDS3-06 14:50

Cosmic-ray acceleration and maximum energy in a supernova remnant shock propagating in a stellar wind with a wind termination shock

Shoma F. Kamijima[1], Yutaka Ohira[2]
[1]Yukawa Institute for Theoretical Physics, Kyoto University, [2]The University of Tokyo

We performed global test particle simulations for cosmic-ray acceleration in core-collapse supernova remnants(SNRs) propagating in the stellar wind and found the cyclic motion between the SNR and wind termination shock, leading to increasing particle energy.

----- Coffee Break 15:05-15:25 -----

[HEDS4] 15:25-17:00
Turbulence & Instability
Chair: Masahiro Hoshino
The University of Tokyo

HEDS4-01 15:25 ***Invited***

Relativistic Particle Acceleration from Kinetic Plasma Turbulence and Instabilities

Vladimir Zhdankin
University of Wisconsin-Madison

I will overview recent numerical results from particle-in-cell simulations of turbulent particle acceleration in relativistic plasmas, with varying parameters and driving mechanisms (including macroscopic instabilities), with relevance to high-energy astrophysical systems.

HEDS4-02 15:50 ***Invited***

Spontaneous Plasma Confinement Transition in Magnetically Confined Fusion Plasmas

Tatsuya Kobayashi[1,2,3]
[1]National Institute for Fusion Science, National Institutes of Natural Sciences, [2]The Graduate University for Advanced Studies, SOKENDAI, [3]Research Institute for Applied Mechanics, Kyushu University

A long-standing mystery, low-to-high confinement transition was clarified by a detailed measurement of the radial electric field (Er) and turbulence. Across the transition, an edge localized Er structure was spontaneously excited that leaded to transport reduction. The radial charge separation due to different trajectories of ions and electrons was found to play a role for the Er excitation.

Oral, Tuesday, 23 April PM

ICNN <Room 414+415>

ICNN6-04 14:45

Carrier Leakage in Electrically-Driven Photonic Crystal Membrane Lasers

Mathias Marchal, Nikolaos Chatzaras, Evangelos Dimopoulos, Andrey Marchevsky, Aurimas Sakanas, Marco Saldutti, Kasper Roed Spiegelhauer, Yi Yu, Kresten Yvind, Meng Xiong, Jesper Mørk
Denmark Technical University

We developed a 2D model of carrier transport in photonic cyrstal lasers that predicts the presence of unconventional leakage paths. This explains experimental observations of low injection efficiencies and enhanced spontaneous emission at doping interfaces.

----- Coffee Break 15:00-15:20 -----

[ICNN7] 15:20-16:50
Session 6
Chair: Takashi Asano
Kyoto University

ICNN7-01 15:20 ***Invited***

Atomic-scale investigation of photoelectric energy conversion in a single molecule

Miyabi Imai-Imada[1,2]
[1]Surface and Interface Science Laboratory, RIKEN, [2]JST PRESTO

Photoinduced electron transfer (PET) from an excited molecule is essential in light energy conversion, such as photocurrent generation. Recently, we achieved atomic resolution in photocurrent measurement by combining a scanning tunneling microscope with a tunable laser. The direction and the spatial distribution of the photocurrent show bias-voltage dependency. By detailed analysis, we succeeded to describe the mechanism based on the molecular orbitals.

ICNN7-02 15:50

Unraveling Molecular-Specific Details with Dual-Resonant Infrared Plasmonic Metasurfaces to Probe Dynamic Affinity in Biomolecular Interactions

Tang Dang, Jiaqi Yang, Shuting Ma, Hitoshi Tabata, Hiroaki Matsui
The University of Tokyo

By specifically tracking the real-time binding process among biomolecules using the SEIRA platform, we can gain insights into the affinity between these biomolecules. This knowledge is valuable for applications such as antibody screening and biomedicine.

LDC <Room 301>

LDC3-05 14:45

Structured NIR and Yellow-Orange Light Generation from $\chi^{(2)}$ Nonlinear Photonic Crystals

Jie Hua Lai[1], Kai Hsun Chang[1,3], Bai Wei Wu[1], To Fan Pan[1], Ming Shun Tsai[1], Hung Hsiang Chiu[2], Chia Chun Fan[1], Safia Mohand Ousaid[3], Azzedine Boudrioua[3], Hiroyuki Yokoyama[4], Eiji Higurashi[4], Hidefumi Akiyama[5], Chih Ming Lai[6], Lung Han Peng[1,2]
[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, [2]Dept. Elec. Eng. National Taiwan University, Taipei 106, Taiwan, R.O.C., [3]Laboratoire de Physique de Lasers CNRS UMR 7538, Université Paris 13, Sorbonne Paris Cité, Villetaneuse, France, [4]Graduate school of engineering, Tohoku University, Aramaki Aza Aoba, Aoba-ku, Sendai, Miyagi 980-8579, Japan, [5]The Institute for Solid State Physics, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8581, Japan, [6]Electronic and optoelectronic system research laboratories, Industrial Technology Research Institute, Hsinchu, 310401, Taiwan

We reported structured beams due to simultaneously multi-optical parametric oscillations (OPO). For the dual-OPO crystal, the paired signal waves at (965, 980) nm were shown to reside on the opposite sides of the cavity mode whose pattern changed elegant Hermite-Gaussian as pump beam scanned over the $\chi^{(2)}$ nonlinear photonic crystal. Such change in the nonlinear gain profile also introduced visible structured beam in yellow-orange due to cascaded SHG or SFG.

LDC3-06 15:00

Design of high-power tunable LED illuminant for luminance meter calibration

Urszula Joanna Blaszczak[1], Krzysztof Baran[2], Marian Gilewski[1], Lukasz Gryko[1], Marcin Lesko[2], Henryk Wachta[2], Maciej Zajkowski[1]
[1]Bialystok University of Technology, [2]Rzeszow University of Technology

Proposals of the constructions of laboratory standards and sources for various applications based on electroluminescent sources are increasingly popular. This manuscript describes the research on designing the multichannel LED source for photometry. The optimized set of LEDs, composed of 25 channels, reproduces the illuminant A with a mismatch error of 1.58%.

----- Coffee Break 15:15-15:30 -----

[LDC4] 15:30-17:00
Light sources and components 2
Chairs: Tetsuya Yagi
Nichia Corporation
Yasuaki Hirano
Sharp Fukuyama Laser Co.,Ltd.

LDC4-01 15:30 ***Invited***

Development of high power GaN laser diode and its applications

Yasuaki Hirano, Yoshihiko Tani, Hiroshi Kitamura, Sadamu Miyamoto, Akira Ariyoshi
Sharp Fukuyama Laser Co., Ltd

In recent years, visible semiconductor laser diodes (LDs) have been used in a variety of applications. After that, GaN-based LDs have been investigated and blue and green LDs were developed. In particular, progress has been made recently in improving the characteristics of GaN-based high-power blue-violet, blue, and green LDs. This paper introduces improvements of a GaN-based high-power LDs and an example of its development into new application fields.

OMC <Room 418>

OMC3-04 14:35

Direct generation of visible Bessel-vortex beams from Pr^{3+} fiber laser

Yuto Yoneda[1], Allam Srinivasa Rao[1,2], Yasushi Fujimoto[3], Katsuhiko Miyamoto[1,2], Takashige Omatsu[1,2]
[1]Chiba University, [2]Molecular Chirality Research Center, [3]Chiba Institute of Technology

We herein demonstrate the direct generation of multicolor (523, 605, 637 nm) first-order Bessel-vortex modes from a Pr^{3+} water-proof fluoro-aluminate glass (Pr^{3+}:WPFG) fiber laser by utilizing the chromatic and spherical aberrations of the intracavity lens.

OMC3-05 14:50

Manipulation of photonic jets of topological grating via nematic liquid crystal for beam splitter applications.

Harry Miyosi Silalahi[1], Yu-Zhih Chiang[2], Wei-Fan Chiang[2], Chia-Yi Huang[1]
[1]Tunghai University, [2]National Cheng Kung University

This study demonstrates liquid crystal manipulation of a high-aspect-ratio topological grating for beam splitters. Voltage control dynamically adjusts the refractive index, shifting photonic jets and altering diffraction patterns. This great potential for low-voltage beam splitters in immersive technologies is highlighted.

----- Coffee Break 15:05-15:30 -----

[OMC4] 15:30-17:15
Session 2
Chairs: Quan Sheng
Tianjin University
Ryuji Morita
Hokkaido University

OMC4-01 15:30

Structured Light for Applications in Solid-state Materials

Yu-Chen Chang, Yu-Chiao Chan, Ting-Hua Lu
National Taiwan Normal University

This study investigates the interaction between structured light with spin and orbital angular momentum (OAM) and layered MoS_2. Utilizing a spatial light modulator and optical measurement system, the research explores the excitation of OAM light and its impact on MoS_2, examining responses through photoluminescence and Raman spectroscopy.

Oral, Tuesday, 23 April PM

OPTM <Room 213>

OPTM5-02 14:15

Development of shadow moiré-based measurement technique for ceramic substrate surface topography measurement

Hunglin Hsieh, Haowen Chia, Yucheng Yang
National Taiwan University of Science and Technology

A shadow moiré technique for surface topography measurement is proposed. The proposed technique is developed based on the shadow moiré theory and the fast Fourier transform method, possessing advantages of large area and high resolution.

OPTM5-03 14:30

ECG²AN: An rPPG Signal Enhancement Model for Realistic Signal Generation

Seongryeong Lee, Sungho Kim
Yeungnam University

This study introduces an ECGAN based on non-contact rPPG to generate ECG signals, mapping facial chrominance signals, overcoming current limitations and demonstrating.

OPTM5-04 14:45

Prototype of Handheld Full Color 3D Measurement Device Using Linear LED Device and Cylindrical Lens Array

Motoharu Fujigaki, Siyan Zhu, Shunsuke Hibino
University of Fukui

In this study, we prototyped a handheld full color 3D measurement device using a linear LED device and a cylindrical lens array. The exposure time could be shortened because two times brightness fringe pattern against than the conventional method can be projected with the cylindrical lens array. The prototype can take images of phase-shifted fringe patterns at 1000 FPS.

----- Coffee Break 15:00-15:30 -----

[OPTM6] 15:30-16:45
Session 6
Chairs: Markus Cornelius Schake
Physikalisch-Technische Bundesanstalt
Motoharu Fujigaki
University of Fukui

OPTM6-01 15:30 *Invited*

Double-sided interferometer for precise thickness measurements

Akiko Hirai, Youichi Bitou
National Metrology Institute of Japan (NMIJ) / Advanced Industrial Science and Technology (AIST)

A double-sided interferometer (DSI) for non-contact SI-traceable absolute thickness measurement has been developed. The DSI uses the light beams reflected on both surfaces of a sample under measurement and doesn't use the light beams transmitted through the sample. The expanded uncertainty of silicon wafer thickness measurement was evaluated as 20 nm (the coverage factor $k = 2$).

OWPT <Room 304>

OWPT1-02 14:30 *Invited*

High-irradiance photoconversion using multijunction photovoltaic devices

John F. Geisz, Danial J. Friedman, Myles A. Steiner, Ryan M. France, Kevin L. Schulte, Sarah Collins, Darin Meeker
National Renewable Energy Laboratory

Photovoltaic devices convert light into electrical energy at high-irradiance for concentrated solar photovoltaics, thermophotovoltaics and laser power converter applications. As the irradiance increases, the efficiency and economics improves until resistance, heating, or Auger recombination losses begin to dominate. We discuss strategies used to improve InGaAs PV performance at high irradiances.

----- Coffee Break 15:00-15:30 -----

[OWPT2] 15:30-17:00
Session 2
Chair: Shiro Uchida
Chiba Institute of Technology

OWPT2-01 15:30

Multi-junction photovoltaic laser power converter product developments

Simon Fafard, Denis Masson
Broadcom

Our recent developments for long wavelength and cryogenic OPCs have unlocked record performances. This presentation will review such recent developments including new ~1470 nm OPCs for cryogenic applications with conversion efficiencies greater than 65%.

SLPC <Room 416+417>

SLPC3-04 14:15

Stable LIPSS formation on transparent materials by data-driven ultrashort pulse laser processing based on optical in-process monitoring

Aiko Narazaki[1], Daisuke Nagai[1,2], Takemichi Miyoshi[1,2], Hideyuki Takada[1], Dai Yoshitomi[1], Godai Miyaji[2]
[1]National Institute of Advanced Industrial Science and Technology (AIST), [2]Tokyo Univ of Agriculture and Technology

We have developed a data-driven USP laser processing by feedback control of the laser intensity based on a novel optical in-process monitoring toward stable LIPSS formation on transparent materials like glasses.

SLPC3-05 14:30

Ultrafast laser cleaving of ultra-thin glass and polymers

Bogusz Stępak, Natalia Grudzień, Rafał Smolin, Yuriy Stepanenko, Michał Nejbauer
Fluence

We present a new regime for UTG cleaving, providing an excellent edge quality compared to the process based on micro-crack generation. We also show hybrid polymer-glass and pure polymer separation using femtosecond pulses and non-diffracting beam. The influence of laser parameters on edge surface roughness is discussed.

SLPC3-06 14:45

On-Machine Measurement Using Optical Interferometry in Holographic Laser Processing

Ren Umetsu, Yoshio Hayasaki, Satoshi Hasegawa
Utsunomiya University

In general, finding the optimal laser irradiation conditions to obtain the desired structure requires a lot of trial and error for even the most skilled laser operator. In this study, on-machine measurement of the processed structure was proposed for efficient search of laser irradiation conditions.

----- Coffee Break 15:00-15:15 -----

[SLPC4] 15:15-17:15
Plenary Session
Chairs: Masahiro Tsukamoto
Osaka University
Yuji Sato
Osaka University

SLPC4-01 15:15 *Invited*

Ultrashort Pulsed Laser Processing in Liquids

Andreas Ostendorf, Philipp Maack, Jan Marx
Applied Laser Technologies, Ruhr University Bochum, Germany

Processing with ultrashort laser pulses usually has been carried out in ambient or gaseous atmosphere. Processing in liquid environment, however, opens a new window with respect to quality and precision.

XOPT <Room 313+314>

XOPT3-04 14:25

Pulse profiles and impressions of Hard X-ray Free Electron Lasers

Mikako Makita[1], Alexey Zozulya[1], Ulrike Boesenberg[1], Dmitrii Bespalov[1], Victorien Bouffetier[1,2], Felix Brausse[1], Christian David[3], Joerg Hallmann[1], Talgat Mamyrbayev[3], Kohei Miyanishi[4], Daniel Mosko[5], Johannes Moeller[1], Bob Nagler[6], Motoaki Nakatsutsumi[1], Angel Rodriguez-Fernandez[1], Kristian Sabol[5], Jan Patrik Schwinkendorf[1,8], Frank Seiboth[7], Roman Shayduk[1], Peter Szeles[5], Jozef Ulicny[5], Patrik Vagovic[7], Wenxin Wang[7], James Wrigley[1], Mohamed Youssef[1], Toshinori Yabuuchi[4,9], Ulf Zastrau[1], Anders Madsen[1]
[1]European XFEL GmbH, [2]ALBA Synchrotron Light Source, [3]Paul Scherrer Institut (PSI), [4]RIKEN Spring-8, [5]Pavol Jozef Safarik University, [6]SLAC National Accelerator Laboratory, [7]Deutsches Elektronen-Synchrotron (DESY), [8]Helmholtz-Zentrum Dresden-Rossendorf (HZDR), [9]Japan Synchrotron Radiation Research Institute (JASRI)

We present preliminary results of XFEL pulse assessments using Talbot and Ronchi shearing interferometries. Highlights includes SASE bandwidth wave front retrieval, X-ray focus reconstructions, optimization of phase-correction plate and sensitivity demonstration with hard X-ray puleses.

XOPT3-05 14:40

Wavefront sensing and Optical Simulations: the Swiss-army knife of FERMI Photon Transport. Advances and current trends.

Michele Manfredda[1], Luka Novinec[1], Alberto Simoncig[1], Flavio Capotondi[1], Emanuele Pedersoli[1], lorenzo raimondi[1], Marco Zangrando[1,2]
[1]ELETTRA - Sincrotrone Trieste, [2]CNR-IOM – Istituto Officina dei Materiali

We investigate the application of wavefront sensing to generate and characterize of OAM beams with KB system at FERMI FEL and of optical simulation to support multicolor FEL experiments.

----- Coffee Break 14:55-15:30 -----

[XOPT4] 15:30-17:00
Optics + Company
Chair: Yong Chu
National Synchrotron Light source II

XOPT4-01 15:30

Future prospects of high-resolution space X-ray optics with ground-based technologies

Ikuyuki Mitsuishi[1], Koki Sakuta[1], Kazuki Ampuku[1], Ryuto Fujii[1], Yusuke Yoshida[1], Kumiko Okada[1], Keitoku Yoshihira[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Takafumi Onishi[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shunsuke Ito[8], Shutaro Mohri[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Meijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/ SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

We have been developing high-resolution space X-ray optics with ground- and space-based technologies for space missions and ground plasma experiments.

NOTE

Oral, Tuesday, 23 April PM

ALPS <Room 303>

ALPS12-02 16:00

High-power Multi-wavelength Diamond Raman Laser

Zhenxu Bai[1,2], Hui Chen[1,2], Xiaowei Li[1,2], Yufan Cui[1,2], Yakai Zhang[1,2], Feng Gao[1,2], Yulei Wang[1,2], Zhiwei Lu[1,2]
[1]Hebei University of Technology, [2]Hebei Key Laboratory of Advanced Laser Technology and Equipment

An order-controllable multi-wavelength diamond Raman laser was demonstrated that operates across both the infrared and visible spectra. The laser is characterized by its high conversion efficiency and high peak power (up to a hundred kilowatts).

ALPS12-03 16:15

Sub-100 fs high-power Kerr-lens mode-locked GHz-repetition-rate Yb:CYA laser

Jie Tao
Xidian University

We report on a 1.045-GHz compact diode pumped Yb: CYA laser with an average power of 2.7 W, a pulse width of 74 fs, and a spectral width of 17 nm.

ALPS12-04 16:30

Cavity-Dumped Yb: CALYO Femtosecond Oscillator based on SESAM assisted Kerr-lens mode locking

Biao Ba
Xidian University

We demonstrate a cavity-dumped diode-pumped Yb: CALYO oscillator mode-locked by SESAM assisted Kerr-lens. Pulses with energy up to 230 nJ and 1.2 μJ were obtained at dumping frequency of 1 MHz and 10 kHz, respectively.

ALPS12-05 16:45

High-Repetition-Rate Operation of Short-Pulse CO_2 Laser Pumped by Longitudinal Pulsed Discharge without Pre-ionization

Kazuyuki Uno[1], Ryo Okawa[1], Shohei Watarai[2], Yasushi Kodama[1,2]
[1]University of Yamanashi, [2]Seidensha Electronics

Our short-pulse CO_2 laser, pumped by longitudinal pulsed discharge and operating without the pre-ionization required for gas lasers excited by pulsed discharge, achieved operation at a repetition rate of 1 kHz.

ALPS <Room 511+512>

ALPS17-02 16:00

High power mechanically Q-switched green Tb:$LiYF_4$ laser

Linpeng Yu[1], Haotian Yang[2], Hiyori Uehara[1,2], Ryo Yasuhara[1,2]
[1]National Institute for Fusion Science, [2]The Graduate University for Advanced Studies, SOKENDAI

We demonstrate a mechanically Q-switched Tb:$LiYF_4$ laser at 544 nm based on an optical chopper. With appropriate chopper settings, 521-μJ, 86-ns pulses at 1 kHz are generated, corresponding to a peak power of 6.1 kW.

ALPS17-03 16:15

Numerical simulation of continuous fiber laser sustained Xe plasma

Yanfei Hu, Qin Sun, Xinbing Wang, Duluo Zuo
Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology

The laser sustained plasma is numerically simulated by using FLASH, the electron temperature and electron density of the plasma are calculated, and the factors affecting the characteristics of the plasma are analyzed.

HEDS <Room 311+312>

HEDS4-03 16:15

Experimental and Simulation Studies of Richtmyer-Meshkov Instability at High Energy Densities

Zhensheng Dai[1], Shaoyong Tu[2], Lifeng Wang[1], Meng Li[1]
[1]The institute of applied physics and computational mathematics, Beijing, China, [2]Reaserch center of laser fusion, Mianyang, China

We developed a planar HED platform for Richtmyer-Meshkov at one hundred thousand joule laser facility. 2D and 3D simulations based on radiation hydrodynamics codes are implemented to analyse the mixwidth and radiography data.

HEDS4-04 16:30

Experimental study of the bubble merger process induced by the strong blast-wave-driven RM instability

Zhiyuan Li[1], Meng Li[1], Shaoyong Tu[2], Zhensheng Dai[1], Lifeng Wang[1], Yingkui Zhao[1]
[1]Institute of Applied Physics and Computational Mathematics, [2]Laser Fusion Research Center, China Academy of Engineering Physics

Bubble merger caused by the hydrodynamic instability is a main pathway for the turbulent transition in the fluids with narrowband initial interface perturbations. We have conducted an experiment about the bubble merger process induced by the strong blast-wave driven Richtmyer-Meshkov(RM) instability at the SG 100kJ laser facility. Our studies show that the mass diffusion effect should be included in the simulations to fit the experiment results.

HEDS4-05 16:45

On the initial linear transient phase in Richtmyer-Meshkov Instability

Francisco Cobos[1], Mario Napieralski[2], Takayoshi Sano[3], Chihiro Matsuoka[4], César Huete[2]
[1]University of Castilla-La Mancha, [2]University Carlos III of Madrid, [3]Osaka University, [4]Osaka City University

It is shown that non-linear models should consider compressible effects happened during the linear transient phase to provide accurate predictions in later stages. An estimation of the duration of this linear transient phase is given.

Oral, Tuesday, 23 April PM

ICNN <Room 414+415>

ICNN7-03 16:05

Surface Enhanced Raman Scattering via Plasmonic-Free α- MoO_3 Nanowires Platforms for Biosensing Application

Jiaqi Yang, Tang Dang, Shuting Ma, Hitoshi Tabata, Hiroaki Matsui
The University of tokyo

We created α-MoO_3 nanowire SERS platforms through catalyst-free synthesis, offering varied heights/compositions by modulating oxygen during laser ablation. Stoichiometric NWs yielded strong SERS (EF 2×10^8) with vivid light scattering. While non-stoichiometric samples show weaker SERS signals due to decreasing scattering following the presence of visible absorptions. This indicates role of electromagnetic enhancement in plasmonic-free α-MoO_3 NW SERS.

ICNN7-04 16:20

Probing Coherent Optical Response of Coupled Excitons and Spin States in a Quantum Dot Molecule

Michelle Lienhart[1], Christopher Thalacker[1], Frederick Bopp[1], Nikolai Bart[3], Johannes Schall[5], Charlotte Cullip[1], Katarina Boos[2], Friedrich Sbresny[2], Andreas Wieck[3], Arne Ludwig[3], Dirk Reuter[4], Sven Rodt[5], Stephan Reitzenstein[5], Kai Müller[2], Jonathan Finley[1]
[1]Walter Schottky Institute, TUM School of Natural Sciences, Technical University of Munich, [2]TUM School of Computation, Information, and Technology, Technical University of Munich, [3]Faculty of Physics and Astronomy, Ruhr-University Bochum, [4]Department of Physics, Paderborn University, [5]Institute of Solid-State Physics, Technical University of Berlin

We explore the coherent response of spatially direct and indirect excitons to a pulsed Rabi drive in a quantum dot molecule. State population is detected off-resonantly via phonon-mediated state transfer. We show that the phonon-mediated relaxation from antibonding to bonding coupled orbitals is spin conserving with a fidelity of >94%.

ICNN7-05 16:35

Nano-Confined Growth of Perovskite Quantum Dots in Transparent Nanoporous Glass

Zhiping Hu[1], Juan Du[1], Zeyu Zhang[1], Fengxian Zhou[1,2], Jin He[2]
[1]Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, [2]Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

Here, the nano-confined growth of perovskite QDs in an optically transparent, robust, and monolithic matrix by using nanoporous glass as a nano-reactor is demonstrated. The nano-channels enable the tunable mono/multi-color emission in full visible range via pore size tailoring or post-halide exchange. Then a rapid-response and reusable redgreen switching light-emitting diode sensor for halomethanes is demonstrated.

LDC <Room 301>

LDC4-02 16:00 *Invited*

Metasurfaces for reprogrammable beam-steering and light-matter interaction

Hodjat Hajian[1], Matthieu Proffit[1], Yongliang Zhang[1], Pascal Landais[2], Louise Bradley[1]
[1]Trinity College Dublin, [2]Dublin City University

Binary control is implemented in a vanadium dioxide based metasurface for dynamic beam-steering at 1550 nm. Optical and thermal performance demonstrates an electrically driven reprogrammable metasurface, providing continuous beam-steering over a 90º range.

LDC4-03 16:30

Design of multi-color laser beam electro-optic deflection device

Shohei Uomi, Takashi Ebara, Yui Otagaki, Hiroshi Murata
Mie University

We propose a new high-speed multi-colored laser beam deflection device using ferro-electric optical crystal with periodically polarization-reversed structures. In this report, the design of electro-optic deflection device for two or three-colored laser beams are presented.

LDC4-04 16:45

Memristor-driven micro-LED technology

Seok Hee Hong, Ho Jin Lee, Kang Min Lee, Jin Kyung Lee, Sim Hun Yuk, Tae Geun Kim
Korea University

Active-matrix micro-LED technology driven by a memristor is realized. Using this technology, alphabet "A" is demonstrated from 12 x 12 micro-LED arrays under pulse amplitude and width modulation via FPGA.

OMC <Room 418>

OMC4-02 16:00

Estimating nonlinear forces, temperature and damping in optomechanical inertial systems

Martin Siler, Alexandr Jonas, Martin Duchan, Vojtech Liska, Tereza Zemankova, Oto Brzobohaty, Pavel Zemanek
Institute of Scientific Instruments of the CAS

We present novel methods for inference of nonlinear optical force, temperature, and damping in optically levitated systems far from thermal equilibrium that use only short and noisy trajectories.

OMC4-03 16:30

3D Orientation Control of Irregular Microparticles Using Adaptive Optical Tweezers

Ryohei Omine[1], Shuzo Masui[2], Shotaro Kadoya[1], Masaki Michihata[1], Satoru Takahashi[1]
[1]Dept. of Precision Engineering, The University of Tokyo, [2]Institute of Innovative Research, Tokyo Institute of Technology

We proposed and demonstrated the concept of adaptive optical tweezers, which realizes 3D orientation control of irregular microparticles by automatically adapting the illumination patterns to the observed shapes of microparticles in real time.

OMC4-04 16:45

Automated polarization control for single-mode optical nanofibers

Georgiy Tkachenko[1,2], Iida Yamato[1], Mark Sadgrove[1]
[1]Tokyo University of Science, [2]University of Bordeaux

We present an all-fiber method for automated control of the polarization state at the waist of single-mode optical nanofibers which are used in many studies on light-matter interaction at sub-wavelength scales.

OMC4-05 17:00

Near-field properties generated by circularly polarized light irradiation on metal nanostructures

Tomoya Oshikiri Oshikiri[1,2], Yasutaka Matsuo[2], Hiromasa Niinomi[1], Keiji Sasaki[2], Hiroaki Misawa[2,3], Masaru Nakagawa[1]
[1]Tohoku University, [2]Hokkaido University, [3]National Yang Ming Chiao Tung University

We evaluated a near-field intensity distribution on a series of chiral and achiral gold nanostructures under circularly polarized light irradiation by multiphoton photoemission electron microscopy and numerical simulations.

Oral, Tuesday, 23 April PM

OPTM <Room 213>

OPTM6-02 16:00

Implementation of the metrological characteristics framework using additively manufactured material measures

Matthias Eifler[1,2,3], Julian Hering-Stratemeier[3,4], Georg von Freymann[3,4,5], Jörg Seewig[2,3]
[1]IU International University of Applied Sciences, Erfurt, Germany, [2]Institute for Measurement and Sensor-Technology MTS, RPTU Kaiserslautern-Landau, Kaiserslautern, Germany, [3]Opti-Cal GmbH, Kaiserslautern, Germany, [4]Physics Department and State Research Center OPTIMAS, RPTU Kaiserslautern-Landau, Kaiserslautern, Germany, [5]Fraunhofer Institute for Industrial Mathematics ITWM, Kaiserslautern, Germany

The new ISO standardization for the calibration, adjustment and performance specification of areal surface topography measuring instruments has been recently released. We describe the opportunities that additive manufacturing of material measures using two photon polymerization provides for the implementation of these standards.

OPTM6-03 16:15

Spin Hall Effect of Light (SHEL) Ellipsometry for surface measurement with different models of optical interface

Naila Zahra[1,2], Yasuhiro Mizutani[1], Tsutomu Uenohara[1], Yasuhiro Takaya[1]
[1]Osaka University, [2]Institut Teknologi Bandung

The observation of Spin Hall Effect of Light (SHEL) using weak measurement leads to many application in various field including for precision measurement. This paper proposes SHEL ellipsometry for surface area measurement by raster scanning for smooth optics measurement. Three optics with different material and optical property are inspected.

OPTM6-04 16:30

In-plane 2-dimensional displacement measurement using sinusoidal phase modulation interferometer

Masato Higuchi, Taku Sato, Masato Aketagawa
Nagaoka University of Technology

We propose a measurement system to observe the wave front change using sinusoidal phase modulation. This system utilizes a high-speed camera and a band-limitless phase meter for 2-dimentinal measurement. In-plane 2-dimensional displacement measurement and laser wave front measurement will be demonstrated.

OWPT <Room 304>

OWPT2-02 15:45

Temperature Measurements of Laser Power Converters using Luminescence

Drew W Cardwell
PowerLight Technologies

Techniques for measuring junction temperature(s) in laser power converter photovoltaics using electro- and photo-luminescence spectroscopy are demonstrated. These techniques enable junction temperature measurements in devices operating under realistic conditions, near the maximum power point.

OWPT2-03 16:00

30 Years of Power by Light Culminate in 10 W LPCs Bound to Shape the Future

Jan Gustav Werthen, Ta-Chung Wu, James Q Liu
Broadcom

Since first commercialized, the photovoltaic power converter continues to enable a growing number of critical applications requiring 100% galvanic isolation. Since the successful introduction of vertical multijunctions, higher power levels and efficiency have steadily been realized, culminating in the first pigtailed 10 W laser power converter.

OWPT2-04 16:15

Characterizing OWPT Efficiency of An LED Row Transmitter Under Misalignments With The Receiver

Dinh Hoa Nguyen
Kyushu University

This paper introduces an analysis for the monotonic dependence of the OWPT efficiency in the air on the distance between the transmitter and receiver planes, where the transmitter is a row of LEDs and the receiver is relatively aligned to the LED row center. A critical value of such inter-plane distance is derived such that beyond which the OWPT efficiency is monotonically decreasing. This is shown to be quite accurate compared to numerical simulation results.

OWPT2-05 16:30 *Invited*

Products and Future Prospects of High-Power Fiber Lasers

Masoud Harooni
IPG Photonics

Principles, products, and future prospects of high-power fiber lasers will be explained. These products are promising as light sources for optical wireless power transmission. IPG Ytterbium fiber lasers are the most compact, reliable and energy efficient industrial lasers on the market.

SLPC <Room 416+417>

SLPC4-02 15:55 *Invited*

Recent Progress of PCSELs for Laser Processing

Susumu Noda
Kyoto University

Photonics-crystal surface-emitting lasers (PCSELs) are a new type of laser that possesses both high power and high beam quality, namely, high brightness, while maintaining the merits (compactness, high efficiency, and high controllability) of semiconductor lasers. In this plenary talk, I will discuss the recent progress of PCSELs and their application to laser processing.

SLPC4-03 16:35 *Invited*

Comparison of Different Laser Powder Bed Fusion Processes; Microstructure and Mechanical Properties

Ola L. A. Harrysson[1,2], Satya Konala[1,2], Erik O'Luanaigh[1,2], Harvey West II[1,2], Christopher Rock[1,2]
[1]Fitts Department of Industrial and Systems Engineering, North Carolina State University, [2]Center for Additive Manufacturing and Logistics, North Carolina State University

Laser Powder Bed Fusion has been around for decades and there are many OEMs on the market. This presentations will investigate material properties and precision when different systems are used for the same material.

XOPT <Room 313+314>

XOPT4-02 15:45

Development of X-ray optics for the solar flare sounding rocket FOXSI-4: ground calibration

Kazuki Ampuku[1], Koki Sakuta[1], Ryuto Fujii[1], Yusuke Yoshida[1], Kumiko Okada[1], Keitoku Yoshihira[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Takafumi Onishi[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shunsuke Ito[8], Shutaro Mohri[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8], Ikuyuki Mitsuishi[1]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Maijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/ SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

We have been developing X-ray optics for FOXSI-4. We fabricated two types of X-ray optics specified for soft / hard X-ray observations and conducted X-ray irradiation tests to evaluate X-ray performances. Consequently, we confirmed that the resultant energy dependence of the effective area is consistent with the expected values. We will report the details and the latest status of our optics.

XOPT4-03 16:00

Highly Flexible Coated Hollow Capillaries for Synchrotron Radiation

Jörn Volkher Wochnowski[1], Ryusei Obata[2,3], Keisuke Kaneshima[2,3], Yoshihito Tanaka[2,3]
[1]Technische Hochschule Lübeck, [2]University of Hyogo, [3]RIKEN SPring-8 Center

In this talk, hollow light waveguides functionalised from the inside with High-Z metals are presented as highly flexible X-ray-optics for synchrotron radiation. The current results obtained at the RIKEN SPring-8 Center are also reported here.

XOPT4-04 16:15

Synchrotron- and substrate-induced modifications on beamline optical elements

Roberta Totani, Matteo Altissimo, Nicola Novello, Anna Bianco, Edoardo Busetto, Lorenzo Raimondi
Elettra Sincrotrone Trieste

We will show a study on two damaged optical element systems, from the Elettra synchrotron and the FERMI free electron laser facilities. The investigation was realized by means of Interferometry, AFM, XRD, Raman and IR Spectroscopy. The obtained results help understanding nature and causes of the damages and thus selecting the most suitable solutions to get rid of, or directly avoid them.

XOPT4-05 16:30

Unlocking New Horizons in Xray Optics with High Aspect Ratio Structures

Adam Kubec, Jan Erjawetz, Ethouba Al-Jassin, Florian Sander, Damien Eschimese, Florian Döring
XRnanotech GmbH

We explore novel deep-etched Silicon applications which can be used for X-ray with aspect ratios well above 200 with smallest feature sizes below 100 nm.This technology will impact manufacturing of refractive lenses, diffractive optics resolution test target and resolution test targets and will open a new avenue for a various applications.

XOPT4-06 16:45

High Efficiency X-ray Optics for Laboratory Instrumentation and Applications

Tomomi Ogaki[1], Wenbing Yun[2], Sylvia JY Lewis[2], SH Lau[2]
[1]Canon Marketing Japan, Inc., [2]Sigray, Inc.

The optics produced by Sigray include ellipsoidal or paraboloidal designs with single or double bounce to direct the x-ray beam on to the sample. As an application of semiconductor device, the x-ray assisted device alteration (XADA) system has been developed by the double paraboloidal mirror lens and the highbrightness x-ray microbeam system. In this study, we report the recent results by the ellipsoidal and the double paraboloidal mirror lens.

NOTE

Oral, Wednesday, 24 April AM

BFSS <Room 413>

[BFSS-OP] 8:50-9:00
Opening Remarks
Chair: Rie H. Kang
GPI

[BFSS1] 9:00-10:20
Business and Finance in Photonics Industries
Chairs: Ryohei Hanayama
GPI
Yasushi Masuda
GPI

BFSS1-01 9:00

Laser Surface Treatment for Sustainable Maintenance of Steel Structures
Kazuhisa Fujita[1], Kazuhisa Fujita[2]
[1]The Graduate School for the Creation of New Photonics Industries, [2]TOYOKO Inc.
This paper reviews a groundbreaking laser technology and standardizations for social implementation, which offers a novel approach to surface treatment for steel structures such as bridges. Maintenance process involves removing old paint, rust, and salt deposits that lead to corrosion. A new laser surface treatment method employing high-power CW (continuous wave) lasers has been developed, offering an effective solution for salt removal.

BFSS1-02 9:20

Exploring Corporate Entrepreneurship in the Photonics Industry: Assessing Internal Environments and Organizational Characteristics
Masanori Ito, Rie H Kang
The Graduate School for the Creation of New Photonics Industries
This study aims to assess the applicability a tool for evaluating the internal environment promoting entrepreneurship, within new business development department of photonics industry companies and determine if it reflects the specific environment of these target companies. The results of the psychometric assessment suggest the possibility of identifying characteristics specific to new business development departments and photonics industry companies.

BFSS1-03 9:40

A Study of the Process of Co-creation Emergingin New Product Development: Considerations from Practical Cases in the Photonics Industry
Kentaro Goto[1], Yasushi Masuda[2]
[1]Shizuoka University, [2]The Graduate School for the Creation of New Photonics Industries
The study aims to clarify the process of co-creation emerging in new product development. Therefore, we analyze the practical cases in the photonics industry and use Natural-Born Intelligence (NBI) and Small Self-Actualization (SSA) models as analytical concepts. We clarify the process of NBI co-creation emerging in collaborative research on new product development and indicate the applicability of the principle of superposition in a practical case.

BFSS1-04 10:00

Beginning of social implementation of research results by researchers in the organization - Transformation of Thinking and Action -
Yoshinori Matsui[1,2], Yasushi Masuda[1]
[1]The Graduate School for the Creation of New Photonics Industries, [2]Hamamatsu Photonics K.K.
This paper describes the process of change in the thinking and actions of researchers in organizations when they try to implement their research results in society, by using self-ethnography, which is a research method of the researcher looks deeper into the interaction between self and others by describing and recursively reflecting on his/her own research and action procedures.

BISC <Room 419>

[BISC1] 10:00-11:00
Session 1
Chair: Osamu Matoba
Kobe University

BISC1-01 10:00 ***Invited***

Non-invasive *in vivo* assessment of healthy tendon functions via Multispectral Optoacoustic Tomography
Hsiao-Chun Amy Lin[1], Ivana Ivankovic[2,3], Ali Ozbek[2,3], Ana Orive[2,3], Xose-Luis Deán-Ben[2,3], Daniel Razansky[2,3]
[1]National Tsing Hua University, [2]ETH Zurich, [3]University of Zurich
This study reports on non-invasive human tendon assessments using hand-held, real-time volumetric multispectral optoacoustic tomography; revealing anatomical structure, biomechanical function, haemodynamic and oxygenation response to exercise.

HEDS <Room 311+312>

[HEDS5] 9:00-10:05
Magnetic Reconnection 1
Chair: Hantao Ji
Princeton University

HEDS5-01 9:00 ***Invited***

Nonthermal Particle Acceleration Efficiency of Magnetic Reconnection in Various Plasma Environments
Masahiro Hoshino
The University of Tokyo
Magnetic reconnection has long been known to be the most important mechanism for dissipating magnetic field energy into plasma heating and nonthermal particle acceleration.

HEDS5-02 9:40 ***Invited***

Testing Plasma Physics with Multi-wavelength Observations & Radiative MHD Simulations of Solar Flares
Mark C. M. Cheung
CSIRO Space & Astronomy
Remote sensing of the Sun across the electromagnetic spectrum provides important constraints on a range of (astro) physical phenomena, including magnetic reconnection, magnetised shocks, dynamo action, magnetohydrodynamic turbulence, particle acceleration, solar/stellar flares, and more. In this talk, we will explore a few of these topics with data from spaceborne and ground-based observatories, using them to evaluate state-of-the-art numerical models.

----- Coffee Break 10:05-10:25 -----

Oral, Wednesday, 24 April AM

IP <Room 302>

[IP-OP] 9:10-9:15
Opening Remarks
Chair: Koichi Nitta
Kobe University

[IP1] 9:15-10:15
VR/Display 1
Chairs: Satoshi Hasegawa
Utsunomiya University
Daisuke Sakai
Kitami Institute of Technology

IP1-01 9:15 ***Invited***

Improving the optical efficiency of volume-holographic-optical-element based exit-pupil-expansion
Yeh-Wei Yu, Chung-Wei Lin, Chih-Yao Chang, Yu-Chien Wang, Ching-Cherng Sun, Tsung-Hsun Yang
National Central University/Department of Optics and Photonics

The volume-holographic-optical-element shows advantages based on multiplexing capability. However, it uses broad bandwidth of the light source to expand its field of view. So, we adjust the input wavelength distribution to improve the system efficiency.

IP1-02 9:45

Design and Fabrication of AR Display Systems Using Freeform Holographic Optical Elements
Tong Yang, Yongdong Wang, Dongwei Ni, Dewen Cheng, Yongtian Wang
Beijing Institute of Technology

We demonstrate the design and fabrication of AR display systems using freeform holographic optical elements, which have strong wavefront modulation ability. Advanced system parameters and ultra-compact system structure of AR display systems can be obtained.

IP1-03 10:00

Light field display voxel map acquisition using incoherent holographic camera
Youngrok Kim, Dongwoo Seo, Wonseok Son, Sung-Wook Min
Kyung Hee University

We draw a voxel map that visualizes the expressible depth range according to the viewing angle of light field displays. We exploit an incoherent holographic camera to estimate the distribution of light rays.

LDC <Room 301>

[LDC5] 9:00-10:45
Light sources and components 3
Chairs: Hidekazu Hatanaka
Ushio
Atsushi Satou
Iwasaki Electric

LDC5-01 9:00 ***Invited***

High-performance quantum dot lasers for optical fiber systems
Kouichi Akahane[1], Atsushi Matsumoto[1], Toshimasa Umezawa[1], Ryota Yabuki[2], Yuichi Matsushima[2], Katsuyuki Utaka[2], Satoshi Yanase[3], Tomohiro Maeda[3], Hideyuki Sotobayashi[3], Naokatsu Yamamoto[1]
[1]NICT, [2]Waseda University, [3]Aoyama Gakuin University

This study introduces quantum-dot (QD) lasers operating in the telecom band. The special features of temperature stability of the threshold current, and narrow linewidth of the QD distributed-feedback laser, and wideband optical frequency comb, and ultrashort pulse generation by mode-locked QD lasers were achieved. In addition, the temperature stability of the emission wavelength of the QD laser was demonstrated using bismuth material.

LDC5-02 9:30 ***Invited***

MicroLEDs & Heterogeneous Integration: Enabling next-generation applications
Brian Corbett, Muhammet Genc, Abhinandan Hazarika, Brendan Roycroft, Zhi Li
Tyndall National Institute, University College Cork

Miniaturizing inorganic LEDs to sub-100 microns unlocks opportunities in compact displays, high-bandwidth communication, and optogenetics. We highlight our advancements, including the release and integration of these miniaturized LEDs onto diverse substrates using micro-transfer printing.

LDC5-03 10:00

Superluminescence: Best characteristics of LEDs and Lasers
Brian Corbett, Muhammet Genc, Abhinandan Hazarika, Brendan Roycroft, Juan Morales, Gerard O'Carroll, Zhi Li
Tyndall National Institute, University College Cork

We describe results on blue and red wavelength superluminescent LEDs with broad spectral linewidth, mitigating speckle concerns in illumination. Innovative substrate-emitting SLEDs achieve high power in pulsed mode, suitable for beam scanning display applications.

LEDIA <Room 211+212>

[LEDIA1] 9:00-10:35
UV LED
Chair: N. Okada
Yamaguchi Univerisity

LEDIA-OP 9:00

Opening Remarks
H. Amano
Nagoya University

LEDIA1-01 9:05 ***Invited***

Disinfection of Water using UV-LED
Kumiko Oguma
The University of Tokyo

UV-LED is effective to disinfect water. The presentation will cover the laboratory-scale UV-LED studies targeting microorganisms in water, as well as the field demonstration and implementation of UV-LED reactors at water supply systems in practice.

LEDIA1-02 9:35 ***Invited***

Short-term degradation mechanisms of 275-nm-band AlGaN quantum well deep-ultraviolet light emitting diodes fabricated on a sapphire substrate
Shigefusa F Chichibu[1], Koji Okuno[2], Masaki Oya[2], Yoshiki Saito[2], Hisanori Ishiguro[3], Tetsuya Takeuchi[3], Kohei Shima[1]
[1]Tohoku University, [2]Toyoda Gosei Co. Ltd., [3]Meijo University

Short-term degradation until 102 h of 275-nm-band AlGaN-based deep-ultraviolet light-emitting diodes was attributed to the decrease in carrier injection efficiency caused by the depassivation of initially H-passivated point defects in the $Al_{0.85}Ga_{0.15}N$ electron blocking layer.

LEDIA1-03 10:05 ***Invited***

Technology development for long life and high efficiency DUV LEDs
Yoshiki Saito[1], Atsushi Miyazaki[1], Shinya Boyama[1], Koji Okuno[1], Masaki Oya[1], Keita Kataoka[2], Tetsuo Narita[2], Kayo Horibuchi[2], Maki Kushimoto[3], Yoshio Honda[3], Hiroshi Amano[3], Hisanori Ishiguro[4], Tetsuya Takeuchi[4], Kohei Shima[5], Shigefusa F Chichibu[5]
[1]Toyoda Gosei Co., LTD., [2]Toyota Central R&D Labs., Inc., [3]Nagoya University, [4]Meijo University, [5]Tohoku University

Efficiency improvements in AlGaN-based deep ultraviolet (DUV) light-emitting diodes (LEDs) are expected to enable complete replacement of mercury lamps in the future.

Oral, Wednesday, 24 April AM

LSSE <Room 316>

[LSSE4] 9:00-10:30
Industrial Application & Neuclear Application 1
Chairs: Akihiko Nishimura
JAEA
Noboru Hasegawa
QST

LSSE4-01 9:00 *Invited*

Metal recovery from liquid wastes by pulsed laser-irradiation
Hironori Ohba[1,2], Ryuzo Naknishi[2], Morihisa Saeki[2]
[1]Japan Atomic Energy Agency (JAEA), [2]National Institutes for Quantum Science and Technology (QST)
Utilizing the fundamental process of laser-matter interaction, we performed elemental separation using laser-induced particle formation technology to recover precious metals from industrial liquid wastes.

LSSE4-02 9:30 *Invited*

Fiber-coupled acoustic wave-assisted microchip LIBS system for elemental composition and surface imaging of nuclear fuel debris
Munkhbat Batsaikhan, Hironori Ohba, Katsuaki Akaoka, Ikuo Wakaida
Japan Atomic Energy Agency
A fiber-coupled acoustic wave-assisted microchip LIBS system for elemental composition and surface imaging was developed and tested on surrogate debris samples.

LSSE4-03 10:00 *Invited*

Research and Development of Heat Resistant FBG Sensors for Reactor Decommission and its Related Applications - version 2024
Akihiko Nishimura[1,2], Tsugio Ide[3], Nobuyuki Ishihara[3], Koji Takasaki[1]
[1]Japan Atomic Enery Agency, [2]Univ. Fukui, [3]deltafiber.jp
Heat/radiation resistant FBG sensing was demonstrated at the exhibition booth of Japan Society of Maintenology 2023 at Tohoku University promoted by deltafiber.jp. The progress will be presented in OPIC-LSSE 2024.

OMC <Room 418>

[OMC5] 9:00-10:15
Session 3
Chairs: Masaaki Ashida
Osaka University
Tyler Neely
University of Queensland

OMC5-01 9:00 *Invited*

Orbital Angular Momentum: New Directions for Sensing and Manipulation
Kishan Dholakia
University of Adelaide Australia
Light beams possessing orbital angular momentum are used for an ultra-compact, microfluidic refractive index sensor based on measurement of the azimuthal index. The approach has a resolution that may exceed 10^{-5} RIU.

OMC5-02 9:30

2-dimensional direct print of active materials by optical vortex induced forward transfer
Kaito Sato[1], Tetsuya Fukuda[1], Ken-ichi Yuyama[2], Mitsumasa Hanaoka[1], Katsuhiko Miyamoto[1], Takashige Omatsu[1]
[1]Chiba University, [2]Osaka Metropolitan Univesity
We demonstrate the direct print of active materials colloidal suspension by utilizing the optical vortex induced forward transfer. This demonstration allows the fabrication of freeform printed microchannels for study of active materials living dynamics.

OMC5-03 9:45

Visualizing three dimensional dynamics of quantized vortices in superfluid helium
Yosuke Minowa, Yuki Yasui, Masaaki Ashida
Osaka University
We demonstrated the 3-dimensional visualization of quantized vortices in superfluid helium with silicon nanoparticles. Silicon nanoparticles were formed and dispersed in situ with pulsed laser ablation in the superfluid helium. By combining two images of an identical quantized vortex, each taken from a different direction, we reconstructed a three-dimensional structure of the quantized vortex.

OMC5-04 10:00

Analysis of enhanced photoluminescence in plasmonic nanocavity-molecule coupled system based on nonlocal response theory
Yoshitsugu Tomoshige[1], Mamoru Tamura[1,2], Hajime Ishihara[1]
[1]Osaka University, [2]Osaka Metropolitan University
Plasmonic nanocavity is crucial for enhancing the interaction between nanomaterials and light. We show it is possible to discuss the photoluminescence spectrum with Rabi splitting using our theory.

OWPT <Room 304>

[OWPT3] 9:30-10:30
Session 3
Chair: Takeo Maruyama
Kanazawa Univ.

OWPT3-01 9:30 *Special*

The First Demonstration of Laser Power Beaming in Orbit
Paul Jaffe[1], Elias Wilcoski[1], Chris DePuma[1], Ellen Wagner[1], David Chen[2], James Baughman[3]
[1]U.S. Naval Research Laboratory, [2]University of Virginia, [3]Gulfview Research, Inc.
This paper summarizes the results of the first instance of laser power beaming in space. The experiment demonstrated the highest power received (2.49 W), longest distance traversed (1.45 m), and highest end-to-end efficiency (12.4%) of any demonstration in orbit.

OWPT3-02 10:00

Design of the cell connection configuration of photovoltaic panel using an optimization algorithm
Natsuha Ochiai, Kazuto Kashiwakura, Yohei Toriumi, Yukiko Suzuki, Toru Tanaka
NTT Space Environment and Energy Laboratories
To improve the conversion efficiency, we investigated the use of an optimization algorithm for the cell connection configuration of the photovoltaic device. We confirmed effectiveness of the optimization design.

Oral, Wednesday, 24 April AM

SLPC <Room 416+417>

[SLPC5] 9:00-10:15
Micro Nano Processing 2
Chairs: Mizue Mizoshiri
Nagaoka University of Technology
Godai Miyaji
Tokyo University of Agriculture and Technology

SLPC5-01 9:00 *Invited*

Optical data recording in silica for the sustainable archival cloud storage
Masaaki Sakakura, Patrick Anderson, Erika B. Aranas, Richard Black, Marco Cabellero, Burcu Canakci, Andromachi Chatzieleftheriou, James Clegg, Daniel Cletheroe, Tim Deegan, Austin Donnelly, Rokas Drevinskas, Ariel Gomez Diaz, Teodora Ilieva, Russell Joyce, Sergey Legtchenko, Antony Rowstron, Nina Schreiner, Ioan Stefanovici, David Sweeney, Charles Whittaker, Hugh Williams, Stefan Winzeck
Microsoft Research Cambridge
Nano-structuring in silica using femtosecond laser enables cost-effective long-term storage for sustainable cloud service in the era of data explosion. We will discuss how the technology will make the archival storage in the next generation.

SLPC5-02 9:30

Realization of form birefringent structures in polymers using femtosecond laser processing
Darius Gailevicius[2], Domas Paipulas[2], Maciej Kretkowski[1], Saulius Juodkazis[3], Vygantas Mizeikis[1]
[1]Shizuoka University, [2]Vilnius University, [3]Swinburne University of Technology
Form birefringence is important in photonics because it allows one to control polarization state of light using compact structures made of non-birefringent materials. Here we report on realization of form birefringent phase retarder structures working at visible wavelengths using 3D laser printing in polymeric photoresists. Realization of compact structures exhibiting high phase retardation at visible wavelengths is demonstrated.

SLPC5-03 9:45

Selective Generation of Cu Electrodes on Ultra-Thin Glass by Femtosecond Laser Reductive Sintering of CuO
Kay Bischoff[1], Tim Ehmes[1], Cemal Esen[2], Ralf Hellmann[1]
[1]Applied Laser and Photonics Group, University of Applied Sciences Aschaffenburg, [2]Applied Laser Technologies, Ruhr University Bochum
This contribution demonstrates and specifies the maskless, vacuum-free, and flexible electrification of ultra-thin glass using femtosecond reductive laser sintering of highly dispersed CuO nanoparticle-based precursors for the fabrication of conductive copper electrodes.

SLPC5-04 10:00

Low-power Laser Coloration by Oxidation and Deformation of Self-assembled AL-PS Nanosphere Arrays
Maxim Elizarov, Ning Li, Fei Xiang, Andrea Fratalocchi
King Abdullah University of Science and Technology
We introduce an approach for low-power (10 mW), high-resolution (33k DPI), wide-gamut laser coloration on a pre-processed metamaterial of self-assembled nanoparticles. Controllable material oxidation and deformation allows optical response tuning by CW laser.

TILA-LIC <Room 315>

[TILA-LIC1] 9:00-10:30
Opening & ATLA Project - 1
Chairs: Nicolaie Pavel
National Institute for Laser, Plasma and Radiation Physics - INFLPR, Magurele, Romania
Takunori Taira
RIKEN SPring-8 Center, Sayo-gun, Japan

TILA-LIC1-01 9:00 *Keynote*

DFC-chip Tiny Integrated Laser.
Takunori Taira
RIKEN SPring-8 Center, Japan
A compact power laser is attractive for laser-driven particle acceleration to open new door of the high energy physics, and industrial power laser applications. The potential of DFC (distributed face cooling)-chip for tiny integrated laser will be discussed as the next generation compact power lasers.

TILA-LIC1-02 9:30

Yb Disk and DFC Laser for Intense THz Generation
Mitsuhiro Yoshida[1], Rui Zhang[1], Xiangyu Zhou[1], Arvydas Kausas[2], Hideki Ishizuki[2], Takunori Taira[2]
[1]High Energy Accelerator Research Organization, [2]RIKEN RSC
The MgO:PPLN is currently best candidate for intense THz generation using both of the DFG and chirp and delay method. Yb disk and DFC(Distributed Face Cooling) laser are developed for the two wavelength laser or chirped pulsed laser for the DFC and chirp and delay respectively.

TILA-LIC1-03 9:45

Dual wavelength generation using degenerated optical parametric system with multiplexed reflective VBG
Kei Takeya[1,2], Vincent Yahia[1,2], Hideki Ishizuki[2,1], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center
We have demonstrated that a degenerated optical parametric system with multiplexed reflective Volume Bragg grating can generate two-wavelength excitation light for wavelength conversion. By using the degenerated optical parametric system, we were able to convert 1064 nm light from Nd:YAG light into 2126 nm and 2130 nm two-wavelength light with a line width of less than 1 nm. The intensity was a few mJ.

TILA-LIC1-04 10:00

Commercial products associated to Micro Solid-State Photonics and Tiny Integrated Lasers
Hiroyuki Takigami[1,2,3]
[1]RIKEN SPring-8 Center, [2]TILA-consortium, [3]Micro Solid-State Association
Commercial products related to Micro Solid-State Photonics and Tiny Integrated Lasers will be introduced from several companies associated with TILA-consortium, which is is made up of general members, from companies and other organizations, and offers value chain activity across industry, government, and academia.

XOPT <Room 313+314>

[XOPT5] 9:00-10:15
Mirror
Chair: Satoru Egawa
The University of Tokyo

XOPT5-01 9:00 *Invited*

Removal of systematic errors in metrology for ultra-accurate x-ray mirrors
Josep Nicolas, Albert Van Eeckhout, Igors Sics, Dominique Heinis
ALBA Synchrotron Light Source
We present numerical methods for the data analysis of metrology insturments like NOM and stitching interferometers, aimed at removing the systematic errors that limit their accuracy. We analyze the methods and provide experimental results.

XOPT5-02 9:30

Development of stitching interferometry and ion beam figuring methods for high precision X-ray mirrors
Qiushi Huang
Tongji University
X-ray mirrors with high precision are studied using stitching interferometry and ion beam figuring. Flat mirrors with maximum length of 500mm and elliptical mirror were manufactured with around 1 nm (RMS) accuracy.

XOPT5-03 9:45

Ultracompact Kirkpatrick-Baez mirror for forming 20-nm achromatic soft-X-ray nanoprobes
Takenori Shimamura[1,2], Yoko Takeo[1,2], Fumika Moriya[3], Takashi Kimura[1], Mari Shimura[4,5], Yasunori Senba[2,4], Hikaru Kishimoto[2], Haruhiko Ohashi[2,4], Kenta Shimba[3], Yasuhiko Jimbo[3], Hidekazu Mimura[6]
[1]The Institute for Solid State Physics, The University of Tokyo, [2]Japan Synchrotron Radiation Research Institute, [3]School of Engineering, The University of Tokyo, [4]RIKEN SPring-8 Center, [5]Department of Intractable Diseases, Research Institute, National Center for Global Health and Medicine, [6]Research Center for Advanced Science and Technology, The University of Tokyo
A pair of ultracompact mirrors in the Kirkpatrick-Baez geometry produced unprecedented sub-50-nm achromatic soft-X-ray probes. Bicolor nanoprobes with 1- and 2-keV soft-X-rays were generated using this mirror to enhance and observe soft-X-ray fluorescence.

XOPT5-04 10:00

Analytical and Simulation investigation of scattering effects induced by surface defects on X-ray mirrors
Lorenzo Raimondi, Matteo Altissimo
Elettra-Sincrotrone Trieste
This work discusses the degradation of the PSF due to the scattering induced by mirror surface defects in grazing incidence geometry, from Extreme Ultra Violet to Hard X-ray photon energies. The issue is discussed by comparing a first-order scattering theoretical approach and simulations performed with the main optical simulators present in the Oasys framework.

Oral, Wednesday, 24 April AM

ALPS <Room 511+512>

[ALPSp1] 10:30-12:00
ALPS Poster Session 1
<Exhibition Hall A>

Poster session program p.138-

BFSS <Room 413>

----- Coffee Break 10:20-10:40 -----

[BFSS2] 10:40-11:40
Business and Finance for Sustainable Society
Chair: Rie H. Kang
GPI

BFSS2-01 10:40

A Study on the Creation of New Industries Using Optical Technology in Shinkin Banks
Akifumi Ishii
Hamamatsu Iwata Shinkin Bank
To examine what kind of financial solutions Shinkin banks can provide for the creation of new industries utilizing optical technology, this study conducted an interview survey of 10 people affiliated with universities and private companies related to optical technology, who will be the leaders in the creation of new industries.

BFSS2-02 11:00

Visualization of Non-financial Information -A Case Study of a Japanese B to B Company-
Norio Sakurai
Tokyo International University
This research highlights Mitsui Chemical Co., Ltd., a traditional Japanese B to B company, as a case study and examines why the company's non-financial information disclosure is highly evaluated by institutional investors.

BFSS2-03 11:20

Impact of Institutional Investors on Corporate Biodiversity Responses
Junichi Hayashi
Aoyama Gakuin University
Performing a logit analysis of data from Japanese companies to examine the impact of institutional investors on companies' biodiversity responses, we found that companies that engage in a dialogue with the institutional investors are more likely to disclose their biodiversity responses, that is, make disclosures under Task Force on Climate-Related Financial Framework, an information disclosure framework (TNFD).

BISC <Room 419>

BISC1-02 10:30

Flexible-sampling Raman probe system: On-demand spatial and spectral analysis of biological specimens
Yasuaki Kumamoto[1], Wataru Sakata[1], Katsumasa Fujita[1,2]
[1]Osaka University, [2]National Institute of Advanced Industrial Science and Technology
We developed a flexible-sampling Raman probe system for on-demand spatial and spectral analysis of biological specimens, which can be useful for navigating peripheral nerve preservation surgeries.

BISC1-03 10:45

Enhanced ROS Generation of NiO:Pd Nanoenzymes via Laser-irradiated Photo - chemodynamic Therapeutics
Ze Jiung Huang, Zhi Bin Zhang, Chih Chia Huang
National Cheng Kung University
Novel NiO:Pd nanoenzyme boosts ROS for efficient bladder cancer cell eradication via enhanced catalytic and photothermal properties, marking a breakthrough in combined therapy for tumor immune reversion.

----- Coffee Break 11:00-11:15 -----

[BISC2] 11:15-12:00
Session 2
Chair: Izumi Nishidate
Tokyo University of Agriculture and Technology

BISC2-01 11:15 ***Invited***

Biophotonics in Defense Medicine
Shunichi Sato
National Defense Medical College Research Institute, Japan
In this paper, we describe some important applications of biophotonics to defense/military medicine. Light or laser is a unique physical energy that is least invasive and enables versatile interactions with living tissue and cells. There would be many other potential applications not only for medicine in peacetime but also for medicine in emergency situations.

HEDS <Room 311+312>

[HEDS6] 10:25-11:45
Magnetic Reconnection 2
Chair: Taichi Morita
Kyushu University

HEDS6-01 10:25 ***Invited***

Electron Acceleration and Ion Acoustic Waves during Low-Beta Magnetic Reconnection using Laser-Powered Capacitor Coils
Hantao Ji[1,2], Lan Gao[2], Geoffrey Pomraning[1], Kentaro Sakai[3], Fan Guo[4]
[1]Princeton University, [2]Princeton Plasma Physics Laboratory, [3]National Institute for Fusion Science, [4]Los Alamos National Laboratory
Magnetic reconnection is a ubiquitous fundamental process in astrophysical plasmas and has been studied at low beta using a platform based on laser-powered strong coil currents on electron acceleration and ion acoustic waves.

HEDS6-02 10:50 ***Invited***

Relativistic electron injection acceleration in laser-driven magnetic reconnection plasmas
Jiayong Zhong
Faculty of arts and sciences, Beijing Normal University
The standard gamma-ray burst (GRB) prompt emission model is the internal shock (IS) model. The internal collision-induced magnetic reconnection and turbulence (ICMART) model is acceptable to overcome these criticisms in theoretical and physical scenarios. Here, we partially and experimentally investigate the feasibility of this model by using intense laser facilities.

HEDS6-03 11:15

Turbulent magnetic reconnection generated by intense lasers and electron acceleration
Yongli Ping
Beijing Normal University
We report the turbulent magnetic reconnection process in the laser-driven solid targets experiment with formation of a fragmented current sheet in this paper. Then, it is shown that the parallel electric field dominates electron acceleration in the turbulent magnetic reconnection processes while the betatron mechanism plays a cooling role.

Oral, Wednesday, 24 April AM

ICNN <Room 414+415>

[ICNNp] 10:30-12:00
ICNN Poster Session
<Exhibition Hall A>

Poster session program p.140

IP <Room 302>

----- Coffee Break 10:15-10:45 -----

[IP2] 10:45-12:00
VR/Display 2
Chair: Hiroyuki Suzuki
Gunma Univ., Japan

IP2-01 10:45

A lightfield type near eye display based on a pinhole array with extended range of eye pupil sizes using polarization-multiplexed retinal projections

Hyeontaek Lee, Hee-Jin Choi
Sejong University

A lightfield type near display based on a pinhole array can achieve a compact form factor but also suffers from narrow range of pupil sizes. In this paper, we propose a novel method to extend the range of available eye pupil sizes of the device using polarization-multiplexed retinal projections.

IP2-02 11:00

Enhancement of the color uniformity of a VHOE-waveguide-based AR eyewear display through drive signal management scheme

Zih-Fan Chen[1], Shiuan Huei Lin[1], Vera Marinova[2], Ken Y. Hsu[1]
[1]*National Yang Ming Chiao Tung University,* [2]*Institute of Optical Materials and Technologies*

In this paper, we introduce a streamlined approach—using a drive signal management scheme on a micro-display for optical engine—to enhance color uniformity in AR eyewear displays. With VHOEs and a waveguide, our method achieves a full-color display, 30° FOV, and less than 3% ΔELab color non-uniformity, requiring only one waveguide and three RGB gratings.

IP2-03 11:15

Evaluation on Basic Characteristics of a Profile Sensor with Built-in Center-of-Gravity Calculation Circuit

Yoshinori Matsui[1], Keisuke Uchida[1], Kazuhiro Nakamura[1], Kenta Endo[2], Yukinobu Sugiyama[2], Munenori Takumi[1]
[1]*Central Research Laboratory, Hamamatsu Photonics K.K.,* [2]*Solid State Division, Hamamatsu Photonics K.K.*

We have developed a profile sensor with a built-in center-of-gravity position calculation circuit. We conducted micro vibration measurement experiments and confirmed that the 41.667[kHz] tracking mode can measure the positional fluctuation of the center of gravity in more detail than the normal mode.

LDC <Room 301>

LDC5-04 10:15

Study of saturation effects in Ceramic phosphors for high-power laser lighting

Yoshio Manabe, Hiroshi Fuji, Kana Fujioka, Kazuhisa Yamamoto
Osaka University

We investigated the saturation behavior of phosphor emission due to laser excitation. It was found that the saturation behavior of sample is related to the optical propagation of laser light.

LDC5-05 10:30

Improved ternary-composite-ceramic phosphors for warm-white laser lighting

Hisashi Minemoto[1], Kana Fujioka[1], Hiroshi Fuji[1], Kazuhisa Yamamoto[1], Tsuneo Kusunoki[2], Seika Tokumitsu[2], Hideo Kawabe[2]
[1]*Institute of Laser Engineering, Osaka University,* [2]*New material center, OXIDE Corporation*

We propose improved ternary-composite-ceramic phosphors for warm-white laser lighting. Type A is more power-efficient and Type B is more effective for more warm light. $(Ba,Sr)_2Si_5N_8$:Eu is used as for a red phosphor instead of $Sr_2Si_5N_8$:Eu.

----- Coffee Break 10:45-11:00 -----

[LDC6] 11:00-12:00
XR(AR, MR, VR) and Metaverse Technologies 1
Chairs: Masafumi Ide
Lambda Works
Kenji Yamamoto
Tokushima Universiry

LDC6-01 11:00 ***Invited***

Holographic 3D display system with wide viewing angle and large size

Qiong-Hua Wang, Di Wang, Yilong Li
Beihang University

In this paper, a holographic 3D display system with wide viewing angle and large size is proposed based on a tunable liquid crystal grating. The proposed system shows a viewing angle of 57.4°, which is nearly 7 times of the conventional case with a single spatial light modulator, and the size of the reconstructed image is enlarged by about 4.2 times.

LEDIA <Room 211+212>

----- Coffee Break 10:35-10:40 -----

[LEDIA2] 10:40-11:25
UV devices (1)
Chair: S. F. Chichibu
Tohoku University

LEDIA2-01 10:40

Parallel light rays using ghost secondary source for airborne virus inactivation

Hiroshi Ohno
Toshiba Corporation

A device is proposed for deactivating airborne viruses, utilizing ultraviolet parallel light generated from a parabolic reflector using a non-interfering ghost-like source at its focal point with a curved light guide and an LED.

LEDIA2-02 10:55

Design of UV LEDs based on ultrathin GaN quantum wells emitting below 240 nm

A. Izumi, K. Shojiki, M. Funato, Y. Kawakami
Department of Electronic Science and Engineering, Kyoto University

Ultrathin GaN/Al(Ga)N quantum wells are investigated for far UVC LEDs. Based on simulations, one monolayer GaN/Al0.9Ga0.1N quantum wells emitting below 240 nm are successfully fabricated by metalorganic vapor phase epitaxy.

LEDIA2-03 11:10

Heterojunction Contact Layer UV LED with MgZnO:Ga As p-side Contact Layer

Maki Kushimoto, Tatsuhiro Tanaka, Yoshio Honda, Hiroshi Amano
Nagoya University

We have fabricated and evaluated hetero-tunnel junction contact layer UV LEDs with MgZnO:Ga as the p-side contact layer to solve the low light extraction efficiency of UV-C LEDs.

Oral, Wednesday, 24 April AM

LSSE <Room 316>

----- Coffee Break 10:30-11:00 -----

[LSSE5] 11:00-11:40
Industrial Application & Neuclear Application 2
Chair: Akihiko Nishimura
JAEA

LSSE5-01 11:00

Hydrogen Sulfide (H_2S) Decomposition in the Visible and Infrared Spectral Regions

Hassnain Abbas Khan[2],
Damian Pablo San Roman Alerigi[1],
Adrican Cesar Cavazos Sepulveda[1],
Amir Farooq[2]
[1]EXPEC Advanced Research Center, Aramco, Dhahran 31311, Saudi Arabia, [2]King Abdullah University of Science and Technology (KAUST), Clean Combustion Research Centre, Physical Sciences and Engineering Division, Thuwal 23955-6900, Saudi Arabia

Multispectral photocatalytic conversion of H_2S is investigated with a specific emphasis on the visible (532 nm) and infrared (1064 nm) spectral regions, employing S, CuS, and In_2S_3 catalysts.

LSSE5-02 11:20

Development of mid-infrared Cavity ring-down spectrometer for tritiated water analysis

Momo Mukai[1], Erika Takayama[1], Kota Tsuge[1],
Yuta Suzuki[1], Keisuke Saito[1],
Norihiko Nishizawa[1], Hiroshi Abe[2],
Hideki Tomita[1]
[1]Nagoya University, [2]AIST

We have been developing a Cavity ring-down spectrometer utilizing a mid-infrared laser for the rapid quantitative analysis of trace tritium in water samples. We report on the construction of our measurement system and the results of performance evaluations.

----- Lunch 11:40-13:00 -----

OMC <Room 418>

----- Coffee Break 10:15-10:45 -----

[OMC6] 10:45-12:00
Session 4
Chairs: Satoshi Ashihara
University of Tokyo
Ting-Hua Lu
National Taiwan Normal University

OMC6-01 10:45 ***Invited***

Plasmon - assisted photochemistry, chirality, and the hot - electron generation in plasmonic nanocrystals

Alexander Govorov
Ohio University, USA

The generation of energetic (hot) electrons and the photoheating are intrinsic properties of any optically excited plasmonic nanocrystal [1,2]. In addition, high-energy hot electrons and phototemperature contribute to the kinetic processes observed in colloidal nanocrystals, metal-semiconductor hybrids, plasmonic Schottky photodetectors, and metastructures [1,2].

OMC6-02 11:15

Optical Manipulation of Creeping Crystallization using Mie-resonant Dielectric Metasurface

Hiromasa Niinomi[1], Naoki Takano[1],
Tomoya Oshikiri[1,2], Masaru Nakagawa[1]
[1]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, [2]Research Institute for Electronic Science, Hokkaido University

We investigated the possibility of optical manipulation of creeping crystallization from an aqueous solution using a Mie-resonant silicon (Si) nanodisk metasurface.

OMC6-03 11:30

Rapid modulation of the directions of handedness of optical vortices for precise measurements of helical dichroism

Shun Hashiyada, Yoshito Tanaka
Research Institute for Electronic Science, Hokkaido University

We propose and experimentally demonstrate rapid modulation of the directions of handedness of optical vortices carrying orbital angular momentum (OAM) at around 50 kHz. This modulation is achieved through the rapid modulation of those of circularly polarized lights carrying spin angular momentum (SAM), coupled with the SAM-OAM conversion techniques.

OPTM <Room 213>

[OPTMp] 10:30-12:00
OPTM Poster Session
<Exhibition Hall A>

Poster session program p.140-

OWPT <Room 304>

OWPT3-03 10:15

Laser power beaming: flexible lunar power distribution

Mitchell A. Kirby, Joseph A. Summers,
Jonathan J. Gort, Drew Cardwell, Tom Nugent Jr.
PowerLight Technologies

This work explores the adaptability and versatility of laser power beaming as a cornerstone technology in future power distribution architectures in the lunar environment.

----- Coffee Break 10:30-11:00 -----

[OWPT4] 11:00-12:00
Session 4
Chair: Kensuke Ikeda
CRIEPI

OWPT4-01 11:00 ***Invited***

Self-Power-Feeding Bi-directional Data Transmission using 125-μm Cladding Diameter 4-core Fiber

Masaki Wada[1], Kenji Kurokawa[2],
Takashi Matsui[1], Hiroyuki Iida[1],
Kazuhide Nakajima[1]
[1]NTT Corporation, [2]Kitami Institute of Technology

We demonstrate simultaneous transmission of 1-W electrical power and 10.3-Gbit/s bi-directional data over a 14-km-long 4-core single-mode fiber with a 125-μm cladding diameter. We experimentally clarify the influence of absorption induced by stimulated Raman scattering from a 1550-nm band feed light on the 1310-nm band signal light.

OWPT4-02 11:30

Evaluation of Nonlinear Effects in Hollow-Core Fibers for High-Power Transmission

Souya Sugiura[1], Kai Murakami[1],
Hironori Yamaji[1], Motoharu Matsuura[1],
Takeshi Takagi[2], Kazunori Mukasa[2]
[1]University of Electro-Communications, [2]Furukawa Electric

This study presents an overview of nonlinear effects in hollow-core fibers (HCFs). We experimentally evaluate the non- linearity in terms of stimulated Brillouin scattering and four-wave mixing. Compared with conventional silica-core single-mode fibers, we show that HCFs has ultra-low nonlinearity, which is useful for high-power transmission applications such as power-over-fiber.

Oral, Wednesday, 24 April AM

SLPC <Room 416+417>

----- Coffee Break 10:15-10:30 -----

[SLPC6] 10:30-12:00
Micro Nano Processing 3
Chairs: Godai Miyaji
Tokyo University of Agriculture and Technology
Mizue Mizoshiri
Nagaoka University of Technology

SLPC6-01 10:30 ***Invited***

Preparation of Functional Nanoparticles by Laser Processing in Liquid for Biomedical Application
Hiroyuki Wada
Tokyo Institute of Technology
Functional inorganic nanoparticles such as upconversion and afterglow materials were prepared by laser ablation and melting in liquid for biomedical applications and investigated their optical properties and their effect on cancer therapy.

SLPC6-02 11:00

Laser production of clean energy by laser bubbling in liquids
Guowei Yang, Weiwei Cao, Bo Yan
Sun Yat-sen University
We developed a simple, clean, and efficient laser micro and nano-bubbling in liquids (LBL) to produce clean energy. Our preliminary research has shown that LBL, as a new concept of laser chemistry, will have great potential applications in clean energy manufacturing such as laser overall water splitting to produce hydrogen without any catalysts, and nitrogen activation and solidification including synthetic ammonia and nitric acid.

SLPC6-03 11:15

NA Dependence of Micro-vias drilling on glass Using 248nm Excimer Laser
Tomonari Tanaka[1], Akira Suwa[1], Yasuhiro Adachi[1], Yasufumi Kawasuji[1], Masakazu Washio[2]
[1]Gigaphoton Inc., [2]Waseda University
To understand the high aspect micro-via fabrication mechanism, we report results of the relationship between the Numerical Aperture (NA) of the KrF excimer laser irradiation and the micro-vias depth.

SLPC6-04 11:30

Direct laser writing of non-photosensitive hydroxyapatite using photoreduction-triggered nanomaterial deposition
Hiroaki Nishiyama, Shogo Nara
Yamagata University
We report a versatile direct laser writing, not limited by material photosensitivity, based on photoreduction-triggered nanomaterial deposition, and its application to non-photosensitive hydroxyapatite. Hydroxyapatite-clad microstructures were continuously formed only by laser translation.

TILA-LIC <Room 315>

----- Coffee Break 10:30-11:00 -----

[TILA-LIC2] 11:00-12:00
TILA-LIC 2024 PLENARY SESSION
Chair: Takunori Taira
RIKEN SPring-8 Center, Sayo-gun, Japan

TILA-LIC2-01 11:00 ***Invited***

TBD
Dieter Hoffmann
Fraunhofer-Institut für Lasertechnik ILT, Aachen, Germany
TBD

XOPT <Room 313+314>

----- Coffee Break 10:15-10:30 -----

[XOPTp] 10:30-12:00
XOPT Poster Session
<Exhibition Hall A>

Poster session program p.141-

Oral, Wednesday, 24 April PM

ALPS <Room 511+512>

[ALPSp1]

Poster session program p.138-

----- Lunch 12:00-13:15 -----

[ALPS18] 13:15-14:30
Optical frequency combs / Frequency stabilized lasers and applications (1)
Chair: Norihiko Nishizawa
Nagoya University

ALPS18-01 13:15 ***Invited***

Ultrafast Quadratic Nonlinear Nanophotonics: From Superior Components to Advanced Circuits
Alireza Marandi
California Institute of Technology
I will overview ultrafast nonlinear nanophotonics in lithium niobate including intense parametric amplification, all-optical switching, vacuum squeezing, mode-locked lasers, ultrabroadband sources, and formation of different solitons, and discuss ongoing efforts toward advanced ultrafast nanophotonic circuits.

ALPS18-02 13:45

Highly Sensitive and Practical Mid-infrared Dual-comb Spectroscopy using Dual-comb Fiber Laser with Long-term Coherent Averaging
Akifumi Asahara, Gakuto Fukawa, Takayuki Shimizu, Takashi Kato, Kaoru Minoshima
The Univ. of Electro-Communications
Highly sensitive and practical mid-infrared dual-comb spectroscopy based on a bidirectional dual-comb fiber laser is demonstrated. By implementing real-time and long-term coherent averaging, MIR gas spectroscopy with absolute wavelength is achieved without complex tight-locking system.

ALPS18-03 14:00

High-Power and High-Coherence Fiber Comb System for Broadband Dual-Comb Spectroscopy in Vis–NIR Region
Ruichen Zhu[1], Haochen Tian[1], Runmin Li[1], Sida Xing[2], Thomas R. Schibli[3], Takashi Kato[1], Akifumi Asahara[1], Kaoru Minoshima[1]
[1]Univ. of Electro-Communications, [2]Shanghai Institute of Optics and Fine Mechanics, [3]Univ. of Colorado
This study presents a high-power, highly coherent dual-comb system spanning the Vis–NIR region via nonlinear broadening and wavelength conversion of Er fiber combs. The broad Vis–NIR spectrum is successfully retrieved in DCS.

BFSS <Room 413>

----- Lunch 11:40-12:30 -----

[BFSS3] 12:30-14:00
Special Session 1: Discussions around Listed Companies, including Global Trends, in the Context of Sustainable Finance
Chair: Yumiko Miwa
Meiji University

BFSS3-01 12:30 ***Invited***

A New Light Source: Photonic-crystal Surface-emitting Laser (PCSEL) - On the numerous possibilities for realizing a smart society -
Susumu Noda
Kyoto University
Recently, there is growing interest in realizing a smart society, represented by smart mobility and smart manufacturing, for which laser technology is key, along with the latest digital technologies such as digital twins and machine learning. In this presentation, I will introduce new light sources called photonic-crystal surface-emitting lasers (PCSELs), which are expected to contribute to realizing this smart society.

BFSS3-02 12:40 ***Invited***

Panel Discussion: Discussions around Listed Companies, including Global Trends, in the Context of Sustainable Finance
Yumiko Miwa[1], Mari Yoshitaka[2], Akira Kato[3], Masaki Suwa[4]
[1]Meiji University, [2]Mitsubishi UFJ Research and Consulting Co., Ltd, [3]Tokyo University of Science, [4]OMRON Corporation

----- Coffee Break 14:00-14:15 -----

BISC <Room 419>

----- Lunch 12:00-13:30 -----

[BISC3] 13:30-14:45
Session 3
Chair: Yuan Luo
National Taiwan University

BISC3-01 13:30 ***Invited***

Quantitative Diffuse Reflectance Spectroscopy for Noninvasive Retrieval of Human Total Hb and HbA1c Contents
Ying-Yu Chen[1], Tzyy-Wei Fu[1], Chia-Te Chen[2,3], Hsiu-Chi Cheng[3,4,5], Sheng-Hao Tseng[1,6]
[1]Department of Photonics, National Cheng-Kung University, [2]Department of Nursing, National Cheng Kung University Hospital, [3]Department of Internal Medicine, National Cheng Kung University Hospital, [4]Institute of Clinical Medicine, National Cheng Kung University, [5]Institute of Molecular Medicine, National Cheng Kung University, [6]School of Dentistry, College of Dental Medicine, Kaohsiung Medical University
We demonstrate here a compact, handheld diffuse reflectance spectroscopy device for non-invasive measurement of hemoglobin and HbA1c in human skin, validated on 16 patients, showing high correlation (r=0.886 and r=0.918) with blood test results.

BISC3-02 14:00

Investigation on Characteristic of Oxygen Saturation Change Using Differential Analysis of Skin Spectral Reflectance
Naomichi Yokoi[1], Iori Kojima[2], Tomonori Yuasa[2], Yoshihisa Aizu[2]
[1]Chitose Institute of Science and Technology, [2]Muroran Institute of Technology
In the present study, we have investigated the correlation between oxygen saturation and the differential reflectance by means of the Monte Carlo simulation and the occlusion experiment for human's upper arm.

Oral, Wednesday, 24 April PM

HEDS <Room 311+312>

HEDS6-04 11:30

High Power Nanosecond Laser for Dynamic Shock Compression and roadmap to high peak power laser at high repetition rate

Olivier Zabiolle, Stephane Branly, Florian Mollica, Franck Falcoz, Anna Golinelli, Pierre-Mary Paul
Amplitude Laser

Key words: Pulse shaped nanosecond laser, Dynamic Shock Compression, High Average Power, High Peak Power We report here the latest achievements in the development of high energy high repetition rate nanosecond lasers along with our road map aimed at ramping up the average power which is increasingly requested by the users.

----- Lunch 11:45-13:30 -----

[HEDSp] 13:30-15:00
HEDS Poster
<Exhibition Hall A>

Poster session program p.142-

ICNN <Room 414+415>

[ICNNp]

Poster session program p.140

----- Lunch 12:00-13:30 -----

[ICNN8] 13:30-15:15
Session 7
Chair: Takasumi Tanabe
Keio University

ICNN8-01 13:30 *Invited*

All-dielectric metasurface for highly efficient wavefront manipulation

Kentaro Iwami
Tokyo University of Agriculture and Technology

All-dielectric metasurfaces efficiently manipulate light for various applications. Achievements include a polarization-separating metalens, multicolor holographic movies, and a multifunctional metasurface for atomic clocks, showcasing high efficiency despite fabrication challenges.

ICNN8-02 14:00 *Invited*

Nonlinear optics and soliton frequency combs in ultrahigh-Q microresonators

Shun Fujii
Keio University

Here we show a recent advance in soliton frequency combs in ultrahigh-Q microresonators while highlighting the generation and its applications.

IP <Room 302>

IP2-04 11:30

Aerial volumetric display with fist-sized femtosecond laser excited range

Tatsuki Mori, Kota Kumagai, Yoshio Hayasaki
Utsunomiya University

Aerial volumetric display with light-emitting voxels excited by focused femtosecond laser pulses was developed. The evaluation of the image rendering range was estimated. It had several centimeters in lateral and axial directions.

IP2-05 11:45

Rehabilitation Using Mixed Reality - Basic Study on Finger-Pinching Application for Stroke Patients -

Shintaro Hiratsuka, Daisuke Sakai, Sora Tanaka
Kitami Institute of Technology

We propose the rehabilitation using mixed reality (MR) for chronic stage patients after stroke.

----- Lunch 12:00-13:15 -----

[IP3] 13:15-14:30
Optical Computing / AI Optics
Chair: Naoya Tate
Kyushu University

IP3-01 13:15 *Invited*

High-capacity Optical Networks Based on Spatial-Division Multiplexing Technologies

Hideaki Furukawa
National Institute of Information and Communications Technology

Spatial division multiplexing technologies have been much focused on to extend the capacity limit of conventional optical networks. We present developed high-capacity optical transmission and switching technologies with multi-core/multi-mode fibers to realize Petabit-class optical networks.

IP3-02 13:45

Numerical demonstration of spatial photonic Ising machine with parallel processing based on spatial multiplexing

Suguru Shimomura, Yusuke Ogura, Jun Tanida
Graduate School of Information Science and Technology, Osaka University

In this study, we propose a method for implementing the spatial photonic Ising machine with parallel processing capability. We confirmed that the solution distribution is improved by the spatial multiplexing.

IP3-03 14:00

Deep Neural Network-based Single Pixel Imaging System for Astronomical Observations

Shinjiro Kodama[1], Moe Sakurai[1], Chihiro Sato[1], Yutaka Hayano[2], Mitsuo Takeda[3], Eriko Watanabe[1]
[1]*The University of Electro-Communications,* [2]*National Astronomical Observatory of Japan,* [3]*Utsunomiya University*

We present a preliminary experimental evaluation of atmospheric turbulence suppression by DNN-based single-pixel imaging (SPI). The atmospheric turbulence was generated based on Kolmogorov's theory. We also designed the optical setup combining SPI and astronomical telescope for field experiment.

LDC <Room 301>

LDC6-02 11:30 *Invited*

Holographic Technology for Augmented Reality Near-eye Display

Jinsoo Jeong, Byounghyo Lee, Jisoo Hong
Korea Electronics Technology Institute

This paper explores a novel lightweight augmented reality (AR) holographic projection module, addressing challenges in holographic image quality and display weight. The integration of a holographic projection system and a lens holographic optical element shows promising advancements for AR display technologies.

----- Lunch 12:00-13:15 -----

[LDC7] 13:15-15:00
XR(AR, MR, VR) and Metaverse Technologies 2
Chairs: Tetsuo Shimizu
Epson
Masafumi Ide
Lambda Works

LDC7-01 13:15 *Invited*

Smart AR Glasses for Social Inclusion

Kiyoshi Kiyokawa
NAIST

We live in an era of diversity and inclusion. Our group aims to support the lives of various individuals through research on smart augmented reality (AR) glasses. This paper presents specific examples of our research endeavors.

LDC7-02 13:45 *Invited*

Novel highly efficient pancake optics for HMD named "Double path"

Naru Usukura[1], Takehisa Yoshida[1], Kiyoshi Minoura[1], Yoshiko Honma[2]
[1]*Sharp Display Technology Corporation,* [2]*Kantatsu Company*

We have proposed novel Head Mounted Display (HMD) pancake optics named "Double path" pancake optics to achieve both compactness and high light efficiency simultaneously. We made the prototype with 25.5 mm thickness of optics and confirmed high image quality with 1.8 times higher light efficiency compared to that of conventional one.

Oral, Wednesday, 24 April PM

LEDIA <Room 211+212>

[LEDIA-SP] 11:25-12:37
Short Presentation
Chair: H. Murakami
Tokyo University of Agriculture and Technology

Please see the session of LEDIAp (p.143-).

LEDIA-SP-01 11:25
Demonstration of high aspect ratio etching by Ni mask process for μ-LED monolithic integration

LEDIA-SP-02 11:29
Current Transport and Photodetection in Contacts of Graphene Quantum Dot and GaN

LEDIA-SP-03 11:33
Investigation of sidewall-surface recombination using InGaN based blue and red micro-LEDs

LEDIA-SP-04 11:37
High-efficiency InGaN tunnel-junction laser diode

LEDIA-SP-05 11:41
Improvement of Optical Isolation in GaN-based Integrated Micro-LEDs

LEDIA-SP-06 11:45
Basic properties of heavily Ge-doped GaN and AlGaN prepared by pulsed sputtering

LEDIA-SP-07 11:49
Evaluation of neutron detection characteristics of BGaN detector using long wavelength neutron beam

LEDIA-SP-08 11:53
Separation of AlGaN-based LED structures from AlN/sapphire template by photoelectrochemical etching

LEDIA-SP-09 11:57
Enhancing carrier transport and capture with a good current spreading characteristic via graphene quantum dots in InGaN/GaN multiple-quantum-well light emitting diodes

LEDIA-SP-10 12:01
Electronic structures of κ-Ga_2O_3/Al_2O_3 superlattices

LEDIA-SP-11 12:05
First-Principles Calculations of Bandgap Control of κ-Ga_2O_3 by Uniaxial Strain

LEDIA-SP-12 12:09
Fabrication and Evaluation of Low-B Composition and High Crystallinity BGaN Neutron Detectors for Nuclear Reactor

LEDIA-SP-13 12:13
High temperature and high speed growth of GaN by Cl_2-based HVPE

LEDIA-SP-14 12:17
Investigation of conversion efficiency of different Ga oxidants in OVPE-GaN growth

LEDIA-SP-15 12:21
Vacancies in III-Nitrides (I): Formation under Reconstructed Surfaces

LEDIA-SP-16 12:25
Vacancies in III-Nitrides (II): Diffusion near Hetero Interfaces

LSC <Room 421>

[LSC1] 13:15-14:20
XFEL, time-resolved (1)
Chair: Toshihiko Shimizu
Osaka University

LSC-OP 13:15
Opening Remarks
Hiroki Wadati
University of Hyogo

LSC1-01 13:20 ***Invited***
Ultrafast Study of photocarrier dynamics in water splitting process by time resolved XAFS
Shunsuke Nozawa[1,2], Tomoki Kanazawa[1], Ryo Fukaya[1], Shin-ichi Adachi[1,2]
[1]Institute of Materials Structure Science, KEK, [2]Materials Structure Science Program, SOKENDAI
In this study, cocatalyst nanoparticles were attached on a semiconductor photocatalyst and XAFS was used to observe the carrier behavior within the cocatalyst. This study will lead to a better understanding of the water splitting process and contribute to the development of efficient renewable energy.

LSC1-02 13:40 ***Invited***
Photoinduced non-equilibrium dynamics of magnetic orders in multiferroic manganites studied by time-resolved resonant soft X-ray scattering
Ryo Fukaya[1], Hironori Nakao[1,2], Jun-ichi Adachi[1,2], Shunsuke Nozawa[1,2], Shin-ichi Adachi[1,2]
[1]Institute of Materials Structure Science, High Energy Accelerator Research Organization, [2]Graduate University for Advanced Studies
We investigated elementally-selective photoinduced dynamics of the magnetic orders in multiferroic manganites $R$$Mn_2O_5$ (R=Sm,Gd) by time-resolved resonant soft X-ray scattering. We will discuss the transient dynamics correlated with the magnetic structures and oxygen spin polarization via the O 2p-Mn 3d orbital hybridization.

LSC1-03 14:00 ***Invited***
Ultrafast lattice dynamics of quantum materials studied by time-resolved X-ray diffraction measurements using X-ray free electron laser
Takeshi Suzuki
ISSP, The University of Tokyo
Time-resolved X-ray diffraction measurements using X-ray free electron laser have played an important role in revealing the non-equilibrium lattice structure of solid-state materials. In this presentation, I will talk about our recent results using this method to study the lattice dynamics of quantum materials and briefly discuss future perspectives.

LSSE <Room 316>

[LSSE6] 13:00-15:00
Keynote & Agri-Photonics 1
Chair: Satoshi Wada
RIKEN

LSSE6-01 13:00 ***Keynote***
Who Manage a Future of Agriculture?
Sakae Shibusawa
Tokyo University of Agriculture
Precision agriculture or smart agriculture practices have provided many kinds of data and information relating to farm management, and then how to and who manage the data has become a keen/serious issue. Decision has been a main role of independent farmers for a lond time and decision support is an expectation of precision agriculture. People have witnessed drastic changes in agriculture.

LSSE6-02 14:00 ***Invited***
Impacts of Varied Led Spectra on Growth and Bioactive Compounds Synthesis in Spinach (Spinacia oleacera L.) during Hydroponic Cultivation in a Plant Factory
Nguyen Le Khanh, Nguyen The Ngoc Phuong
Faculty for Agricultural Technology, VNU University of Engineering and Technology
Spinach (*Spinacia oleacera* L.) was cultivated in a hydroponic system and exposed to six LED light formulas, revealing varying effects on growth parameters and nutrient content during both seedling and adult stages.

OMC <Room 418>

OMC6-04 11:45
Imaging of optical chirality near single gold nanoplates illuminated by linearly polarized near-field
Seiju Hasegawa, Riku Kasahara, Kohei Imura
Waseda University
We examined the optical chiral field near a gold nanoplate by aperture-type scanning near-field optical microscopy. The optical chiral field depends on the incident polarization and is localized in the vicinity of the nanoplate.

----- Lunch 12:00-13:15 -----

[OMC7] 13:15-14:30
Session 5
Chairs: Nobuhiko Yokoshi
Osaka Metropolitan University
Kishan Dholakia
University of Adelaide

OMC7-01 13:15 ***Invited***
Customizing superfluid turbulence with vortex tweezers
Tyler W. Neely
University of Queensland
Precision optical control has emerged as a leading technique for the trapping and manipulation of dilute-gas atomic superfluids. I will describe our techniques for using these traps to both confine and stir up quasi two-dimensional (2D) Bose-Einstein condensates (BECs), leading to the recent realization of a vortex-matter simulator of the one-component plasma (OCP), an archetypical model of long-range interacting particles in 2D.

OMC7-02 13:45
Snapshot visualization of initial process in laser-induced forward transfer
Ryota Tamemoto[1], Syunta Kogie[1], Kotaro Sato[1], Keisaku Yamane[1], Yasunori Toda[1], Takashige Omatsu[2,3], Ryuji Morita[1]
[1]Hokkaido University, [2]Chiba Univ., [3]MCRC Chiba Univ.
We demonstrated the snapshot imaging of the temporal evolution of laser-induced cavitation bubbles generated by optical vortex pulse irradiation with ~0.16 Gfps by using our newly developed frequency-swept pulse train generator.

OMC7-03 14:00
Evaluating the spatial resolution of Stokes camera
Shoki Nagai, Monia Akter, Yoko Miyamoto
The University of Electro Communications
A Stokes camera can display the spatial distribution of Stokes parameters S0-S3, but resolution is an issue when capturing fine polarization states. To evaluate the resolution of the camera, we evaluate the degree of contrast loss with increasing spatial frequency. The spatial distribution of S1 in the form of stripes is generated by an interferometer, and the contrast is calculated by varying the spacing between the stripes.

Oral, Wednesday, 24 April PM

OPTM <Room 213>

[OPTMp]

Poster session program p.140-

----- Lunch 12:00-13:00 -----

[OPTM7] 13:00-14:00
Session 7
Chair: Nathan Haen
Utsunomiya University

OPTM7-01 13:00 ***Invited***

Active plasmonics for dynamic color tuning

Atsushi Ono
Shizuoka University

In the plasmonics research field, there is growing interest in techniques for dynamically controlling the surface plasmon resonance wavelength of metal nanostructures by substrate stretching, chemical reactions, external electric field application, and other methods. Dynamic control of the resonance wavelength enables the color tuning of transmitted light, which is promising for sensor applications.

OPTM7-02 13:30

Vertical Movement of Laser Trapped Micro Particle Along the Optical Axis on Periodic Structured Substrate

Mizuki Kikkawa[1], Ryo Takizawa[1], Shotaro kadoya[1], Masaki Michihata[1], Shuhei Kodama[2], Godai Miyaji[3], Satoru Takahashi[1]
[1]Dept. of Precision Engineering, The Univ. of Tokyo, Hongo 7-3-1, Bunkyo-ku, Tokyo, 113-8656, Japan, [2]Department of Mechanical Engineering, Tokyo City University, 1-28-1 Tamadutsumi, Setagaya-ku, Tokyo 158-8557, Japan, [3]Department of Applied Physics, Tokyo University of Agriculture and Technology, 2-24-16 Nakacho, Koganei City, Tokyo 184-0012, Japan

Optical trapping on periodic structured substate enabled micro particle movement along optical axis by changing position of structured substate.

OPTM7-03 13:45

Optical Characterization of Translucent Wood

Ashima Vashistha[1,2], Christophe Couteau[1], Sebastien Patour[2]
[1]University of Technology of Troyes, [2]Woodoo SAS

This study explores the characterization and measurement of optical properties of translucent wood (for industrial applications), considering influential factors such as species structural anatomy (porosity, density), and the fabrication processes used to attain translucency.

----- Coffee Break 14:00-14:15 -----

OWPT <Room 304>

OWPT4-03 11:45

Simultaneous Data and Power Transmission Using a Hollow-Core Fiber for Passive Optical Network

Hironori Yamaji[1], Kai Murakami[1], Souya Sugiura[1], Motoharu Matsuura[1], Takeshi Takagi[2], Kazunori Mukasa[2]
[1]University of Electro-Communications, [2]Furukawa Electric

This paper presents simultaneous data and power transmission using a 1 km hollow-core fiber for passive optical networks. In this paper, we successfully achieved high transmission characteristics of radio-over-fiber data signals with more than 5 W feed light injection.

----- Lunch 12:00-13:30 -----

[OWPTp] 13:30-15:00
OWPT Poster Session
<Exhibition Hall A>

Poster session program p.144

SLPC <Room 416+417>

SLPC6-05 11:45

Deep eutectic solvents as a novel precursor for the direct laser metallization of polymers

Ilya I Tumkin[1], Evgeniia M Khairullina[2], Lev S Logunov[3], Evgeny L Gurevich[4], Andreas Ostendorf[1]
[1]Ruhr University Bochum, [2]Saint Petersburg State University, [3]ITMO University, [4]University of Applied Sciences Münster

Flexible electronics has attracted an increasing attention over the last 10 years as it is at the edge of the development of new portable devices. Laser based technologies are attracting new applications due to the unique properties of laser light, providing the selectivity. It is demonstrated that precursors based on DES can open new directions for direct laser metallisation.

----- Lunch 12:00-13:15 -----

[SLPC7] 13:15-14:30
Industrial Applications / Advanced Lasers and Optical Technologies
Chairs: Hitoshi Nakano
Kindai University
Aiko Narazaki
National Institute of Advanced Industrial Science and Technology

SLPC7-01 13:15 ***Invited***

Beam-Shaping with Multi-Plane Light Conversion to improve laser processes related to the battery manufacturing

Gwenn Pallier, Ivan Gusachenko, Adeline Orieux, Guillaume Labroille
Cailabs, 1 rue Nicolas Joseph Cugnot, 35000 Rennes, FRANCE

This paper explores the integration of Multi-Plane Light Conversion (MPLC) technology in these critical manufacturing steps to enhance efficiency and product quality.

SLPC7-02 13:45

Fine Control of THz Emission with Dual Pre-Pulses in Air

Hsin-hui Huang[1], Takeshi Nagashima[2], Kota Kumagai[3], Yoshio Hayasaki[3], Saulius Juodkazis[1,4,5], Vladimir T. Tikhonchuk[6,7], Koji Hatanaka[3,8]
[1]Swinburne University Of Technology, [2]Setsunan University, [3]Utsunomiya University, [4]Tokyo Institute of Technology, [5]Vilnius University, [6]University of Bordeaux, [7]ELI Beamlines Facility, [8]Okayama University

The emission and polarization control of terahertz waves is important in wide applications. Here, with a pulsed femtosecond laser split into a main-pulse and two pre-pulses, an advanced fine control of THz emission is achieved.

SLPC7-03 14:00

The effect of convection conditions on aberration in the beam delivery system

Ji Hun Kim, Seong Cheol Woo, Joohan Kim
Seoul National University of science and technology

In optical systems, beam delivery technique is important in modern science and industry. Optical systems are used in various environmental conditions such as temperature, humidity, dust, and vibration, leading to potential aberrations. In this study, we used a Shack-Hartmann Wavefront Sensor (SHWFS) for aberration measurements to investigate the effect of convection conditions on aberration in the beam delivery systems.

TILA-LIC <Room 315>

----- Lunch 12:00-13:00 -----

[TILA-LIC3] 13:00-14:15
Laser Ignition
Chair: Jun Hayashi
Graduate School of Energy Science, Kyoto University, Japan

TILA-LIC3-01 13:00 ***Invited***

Recent applications of the miniaturized HiPoLas ignition system

Gerhard Kroupa[1], Michael Börner[2], Nico Rackemann[3], Sebastian Soller[3], Tibor Bereczki[1]
[1]Silicon Austria Labs (SAL), High Tech Campus Villach, Europastraße 12, 9524 Villach, Austria, [2]German Aerospace Center (DLR), Institute of Space Propulsion, 74239 Hardthausen, Germany, [3]Ariane Group GmbH, Robert-Koch-Str. 1, 82024 Taufkirchen, Germany

Development status and recent applications of the miniaturized GenV-HiPoLas ignition system, summarizing more than 10 years of development towards rocket engine ignition, as well as first results of a fibre distribution system will be presented.

TILA-LIC3-02 13:30 ***Invited***

Laser induced ignition and plasma spectroscopy using 10 kHz Nd:YAG lasers on spray facilities

Axel Ivaldi, Laurent Zimmer
Université Paris-Saclay, CNRS, Gif-sur-Yvette, France

The aim of this paper is to investigate potential benefits of using a high-speed laser (10 kHz) to ignite and stabilize a liquid fuel flames by directly igniting droplets. Plasma is formed in droplets crossing the laser beam, not only at the focal point of the beam, leading to multiple ignition spots. The effects of laser frequency as well as laser energy is investigated for various injection parameters.

TILA-LIC3-03 14:00

Pulse-burst mode laser ignition of H_2/air mixtures by a single-beam passively Q-switched Nd:YAG/Cr^{4+}:YAG laser

Oana-Valeria Grigore, Nicolaie Pavel
National Institute for Laser, Plasma and Radiation Physics

Laser ignition of H_2/air mixtures have been investigated in a constant-volume combustion chamber using a passively Q-switched Nd:YAG/Cr^{4+}:YAG laser. Single-pulse ignition and ignition with trains of up to five pulses were done at various pressures.

Oral, Wednesday, 24 April PM

ALPS & HEDS & XOPT <Room 303>

[JS] 14:15-15:45
ALPS/HEDS/XOPT Joint Session
Chairs: Zhaoyang Li
Shanghai Institute of Optics and Fine Mechanics
Makina Yabashi
RIKEN
Youichi Sakawa
Osaka Univ.

JS-01 14:15

Ultrafast laser driven Coherent Terahertz Surface plasmon polariton amplification and electron acceleration
Ye Tian, Yushan Zeng
Chinese Academy of Sciences
In this work, we introduce the use of femtosecond laser to generate the interaction platform between electrons and surface plasmon (SPP), and realize the "amplification" of SPP energy.

JS-02 14:45

High-Resolution Three Dimensional Imaging Using Ptychography
Manuel Guizar-Sicairos
Paul Scherrer Institut
In this talk, I will introduce the basics of lensless imaging and ptychography, and highlight the latest results from the Swiss Light Source.

ALPS <Room 511+512>

ALPS18-04 14:15

Long-Wavelength Infrared Frequency Comb Generation Based on a Bidirectional Dual-comb Fiber Laser
Kousuke Kubota[1], Ryusei Uchiyama[1], Takumi Yumoto[1], Wataru Kokuyama[2], Peter G Schunemann[3], Yoshiaki Nakajima[1]
[1]Toho Univ., [2]AIST, [3]BAE Systems
We generated a long-wavelength infrared frequency comb spanning from 6.0 to 10.0 μm using a bidirectional dual-comb fiber laser that incorporates an orientation-patterned gallium phosphide crystal.

----- Coffee Break 14:30-14:45 -----

[ALPS19] 14:45-15:45
Optical frequency combs / Frequency stabilized lasers and applications (2)
Chair: Yoshiaki Nakajima
Toho Univ.

ALPS19-01 14:45 ***Invited***

Ultra-High Timing Precision Femtosecond Lasers and Applications
Youjian Song
Tianjin University
Advanced attosecond precision optical sampling methods have been developed and used for timing jitter characterization of various ultrafast laser sources, time-of-flight measurement and probe of soliton molecular internal dynamics.

BFSS <Room 413>

[BFSS4] 14:15-15:45
Special Session 2: Discussions around Unlisted Companies, focusing on University-launched Start-ups, in the Context of Sustainable Finance
Chair: Nobuyuki Ogata
Hosei University

BFSS4-01 14:15 ***Invited***

Panel Discussion: Discussions around Unlisted Companies, focusing on University-launched Start-ups, in the Context of Sustainable Finance
Nobuyuki Ogata[1], Sachiyo Nomura[2], Keisuke Goda[3], Takahiro Ikeda[4], Hirokazu Kitahara[5]
[1]Hosei University, [2]Soka University, [3]The University of Tokyo, [4]Pi Photonics, Inc., [5]Archetype Ventures

BISC <Room 419>

BISC3-03 14:15

RGB camera-based real-time monitoring of hemodynamics in intraperitoneal organs using laparoscopic imaging system
Rokeya Khatun[1], Yurika Suzuki[1], Ryuichi Kumashiro[2], Naotake Kuriyama[3], Tetsuo Ikeda[2,3], Hajime Nagahara[4], Izumi Nishidate[1]
[1]Graduate School of Bio-Applications & Systems Engineering, Tokyo University of Agriculture and Technology, [2]Section of General Surgery, Department of Medicine, Division of Oral & Medical Management, Fukuoka Dental College, [3]Center of Endoscopy, Endoscopic Therapy and Surgery, Division of Oral & Medical Management, Fukuoka Dental College, [4]Institute for Datability Science, Osaka University, Osaka University
We developed an RGB camera-based imaging method to monitor the spatial and temporal hemodynamics in intraperitoneal organs using a commercially available laparoscopic imaging system. ***In vivo*** animal experiments with rats demonstrated the ability of the method to evaluate the volume fraction of total hemoglobin and its oxygen saturation of intraperitoneal organs in real time.

BISC3-04 14:30

***In vivo* evaluation of burn depth in skin tissue of rats using hemoglobin parameters estimated by a red-green-blue imaging**
Rokeya Khatun[1], Md Anowar Parvez[1], Kazuhiro Yashiro[1], Yasuyuki Tsunoi[2], Daizoh Saitoh[3], Shunichi Sato[2], Izumi Nishidate[1]
[1]Tokyo University of Agriculture and Technology, [2]National Defense Medical College Research Institute, [3]Kokushikan University
We investigated a red-green-blue camera-based diffuse reflectance imaging for quantifying total hemoglobin concentration, tissue oxygen saturation, and methemoglobin saturation in burn wounds to classify superficial dermal burn, deep dermal burn and non-burned skin in rats.

----- Coffee Break 14:45-15:00 -----

Oral, Wednesday, 24 April PM

HEDS <Room 311+312>	ICNN <Room 414+415>	IP <Room 302>	LDC <Room 301>
[HEDSp]			
		IP3-04 14:15 **Machine-learning-based object recognition from a small number of speckles using the optical memory effect** Yohei Nishizaki[1], Katsuhisa Kitaguchi[1], Mamoru Saito[1], Jun Tanida[2] *[1]Osaka Research Institute of Industrial Science and Technology, [2]Osaka University* We have experimentally demonstrated an efficient machine-learning-based object recognition through scattering media using the optical memory effect. Our method augments a small number of speckles, which are captured within the optical memory effect, using a computer. The experimental results show that the classifier, obtained by augmenting a small number of speckles, has achieved high accuracy.	**LDC7-03 14:15** **Gerchberg-Saxton algorithm with phase constraint for phase-only-hologram generation** Ye-Hao Hou, Qian Huang, Di Wang, Qiong-Hua Wang *Beihang University* In this paper, an improved Gerchberg-Saxton (GS) algorithm with phase constraint is proposed. Comparative analyses are conducted with several conventional GS-based algorithms for phase-only-hologram generation, specifically focusing on the impact of amplitude and phase constraints on holographic reconstruction of 3D scenes. The experiments demonstrate the superior performance of the proposed method in accurately reconstructing phase information.
Poster session program p.142-	**ICNN8-03 14:30** **Transfer printing integration of InP-based membrane lasers on diamond** Takumi Sato[1], Yoshiho Maeda[2], Takuma Aihara[2], Takuro Fujii[2], Suguru Yamaoka[2], Tatsuro Hiraki[2], Koji Takeda[2], Toru Segawa[2], Satoshi Iwamoto[3], Yasuhiko Arakawa[4], Shinji Matsuo[2], Yasutomo Ota[1] *[1]Keio Univ., [2]NTT Device Technology Labs., [3]RCAST, the Univ. of Tokyo, [4]Nanoquine, the Univ. of Tokyo* InP-based membrane lasers have attracted much attention as high-speed and high-efficiency light sources for future optical data communications. In pursuit of their ultimate performance, advanced thermal management will be indispensable. In this work, we used transfer printing and report the fabrication of InP-based membrane lasers directly integrated on a diamond substrate, which has the highest thermal conductivity among any solid materials.	----- Coffee Break 14:30-15:00 -----	**LDC7-04 14:30** **Evaluation of visibility when blur is added to virtual images except for the gaze point on AR-based information display** Yuta Machigashira, Haruki Mizushina, Kenji Yamamoto *Tokushima University* In this paper, we evaluated the visibility of characters in AR-based information display with and without adding blur to images in the periphery of the visual field. As a result, there was no trend common to all subjects due to the addition of blur, but some subjects showed some tendency toward shorter response times.
	ICNN8-04 14:45 **Novel approach for highly accurate measurement of electro-optic coefficient based on transmission Teng and Man ellipsometric method: dependence on measurement wavelengths** Yasufumi Enami *Nagasaki University* We measure highly accurate electro-optic (EO) coefficient for EO materials using a transmission method, overcoming the limitations of the Teng and Man reflection ellipsometric method, which shows tunable-wavelength dependence for the measured EO coefficient, and enhancing reliability and accuracy in EO research.		**LDC7-05 14:45** **Fundamental evaluation of the pseudo-3D perception on the 2D aerial images** Kenta Saito, Haruki Mizushina, Kenji Yamamoto *The University of Tokushima* We evaluated how the pseudo-3D perception of a 2D aerial image was influenced by the luminance and contrast of the background and the distance between the background and the 2D aerial image. The experimental results showed that the pseudo-3D perception tended to occur when both the background luminance and contrast were low. There were individual differences in the pseudo-3D perception of the 2D aerial image by changing the display position of the 2D aerial image.

Oral, Wednesday, 24 April PM

LEDIA <Room 211+212>

LEDIA-SP-17 12:29

Homoepitaxial regrowth of AlGaN on chemically mechanically polished AlGaN templates and its application to UV B laser diodes

LEDIA-SP-18 12:33

RF-MBE growth of AlGaN on low-dislocation-density AlN template substrates

----- Lunch 12:37-13:30 -----

[LEDIAp] 13:30-15:00
LEDIA Poster Session
<Exhibition Hall A>

Poster session program p.143-

----- Coffee Break 15:00-15:15 -----

[LEDIA3] 15:15-16:00
UV devices (2)
Chair: T. Tanikawa
Osaka University

LEDIA3-01 15:15

Characteristics of optical pumped AlGaN-based UV-B lasers on AlGaN templates grown on TMAH wet-etched periodic AlN nanopillars

Yoshinori Imoto[1], Rintaro Miyake[1], Ryosuke Kondo[1], Ryoya Yamada[1], Toma Nishibayashi[1], Eri Matsubara[1], Takumu Saito[1], Shundai Maruyama[1], Yusuke Sasaki[1], Sho Iwayama[1], Satoshi Kamiyama[1], Tetsuya Takeuchi[1], Hideto Miyake[2], Motoaki Iwaya[1]
[1]Meijo University, [2]Mie University

We report that the threshold power density of an optically pumped laser fabricated on AlGaN grown on TMAH wet-etched periodic AlN nanopillars is reduced by half compared to that without wet-etching treatment.

LSC <Room 421>

----- Coffee Break 14:20-14:40 -----

[LSC2] 14:40-15:55
XFEL, time-resolved (2)
Chair: Ryo Fukaya
High Energy Accelerator Research Organization

LSC2-01 14:40 ***Invited***

Observation of the photoreaction in the iron complex solution by time-resolved soft X-ray absorption spectroscopy in KEK-PF

Fumitoshi Kumaki[1], Masanari Nagasaka[2], Ryo Fukaya[1], Jun-ichi Adachi[1]
[1]Institute of Materials Structure Science, High Energy Accelerator Research Organization, [2]Institute of Molecular Science

We have developed the time-resolved soft X-ray absorption spectroscopy system for liquid samples in KEK-PF and measured the photoreaction of iron complex solution. We will discuss the data and compare them with the data measured by time-resolved UV-Vis spectroscopy.

LSC2-02 15:00 ***Invited***

Ordered Structures in Group-III Nitrides: A First-principles Study

Hiroshi Mizuseki[1], Jessiel Siaron Gueriba[2,3], Marilou Cadatal-Raduban[4], Nobuhiko Sarukura[2,5], Eiichi Tamiya[3,6], Yoshiyuki Kawazoe[5,7,8]
[1]Korea Institute of Science and Technology, [2]Institute of Laser Engineering, Osaka University, [3]Institute of Scientific and Industrial Research, Osaka University, [4]Centre for Theoretical Chemistry and Physics, School of Natural Sciences, Massey University, [5]New Industry Creation Hatchery Center, Tohoku University, [6]Advanced Photonics and Biosensing Open Innovation Laboratory, AIST-Osaka University, [7]SRM Institute of Science and Technology, [8]Suranaree University of Technology

In this talk, we will discuss a factor that determines atomistic configuration of constituent elements based on first-principles calculation results, using group-III nitrides. To investigate the ordered phases of mixed group-III nitride ternary alloys, a first-principles based lattice model is applied to survey the atomistic configurations with the lowest formation enthalpy for a wide range of compositions.

LSSE <Room 316>

LSSE6-03 14:30 ***Invited***

"iR Fresh ™", a technology for maintaining freshness of fruits and vegetables after harvest by irradiating with Near-Infrared Light

Ayako Hada
Shikoku Reasearch Institute INC.

After harvest, fruits and vegetables lose their freshness due to respiration and transpiration. In response, we have developed a freshness preservation technology using near-infrared light irradiation, and we will introduce an example of its implementation.

----- Coffee Break 15:00-15:30 -----

OMC <Room 418>

OMC7-04 14:15

Optical force induced by superfluorescence of emitters on a metallic nanofiber

Hideki Arahari[1], Hajime Ishihara[1], Nobuhiko Yokoshi[2]
[1]Osaka University, [2]Osaka Metropolitan University

We assumed a system that enhances the coupling between emitters by fiber-guided surface plasmon modes. We theoretically evaluated the optical forces generated by superfluorescence and investigated the dependence on the number and arrangements of emitters.

----- Coffee Break 14:30-14:45 -----

[OMC8] 14:45-16:00
Session 6
Chairs: Kyoko Namura
Kyoto University
Xiaodi Tan
Fujian Normal University

OMC8-01 14:45 ***Invited***

Single droplet formation with a focused near-infrared laser beam in the temperature responsive ionic liquid

Ken-ichi Yuyama, Maho Tanaka, Yasuyuki Tsuboi
Osaka Metropolitan University

We demonstrate single droplet formation in a thermo-responsive ionic liquid/water mixture by optical tweezers with a focused near-infrared laser beam. Depending on local temperature, a single droplet is formed due to phase separation or trapping of nano-clusters.

OMC8-02 15:15

Space-time surface plasmon polaritons: Wavefront shaping of light and its transfer to surface plasmon waves

Atsushi Kubo[1], Naoki Ichiji[1,2], Hibiki Kikuchi[1], Murat Yessenov[3], Kenneth L. Schepler[3], Ayman F. Abouraddy[3]
[1]University of Tsukuba, [2]The University of Tokyo, [3]University of Central Florida

Space time surface plasmon polaritons (ST-SPPs), a surface wave featuring a concept of optical space-time wave packet (ST-WP), are generated on a metal surface. By using ST-WP as an excitation source, the ST-SPP exhibits characteristics comparable to those of ST-WP, such as non-diffractive propagation.

Oral, Wednesday, 24 April PM

OPTM <Room 213>

[OPTM8] 14:15-15:15
Session 8
Chairs: Naila Zahra
Osaka University
Atsushi Ono
Shizuoka University

OPTM8-01 14:15 ***Invited***

Ultrasonically controlled liquid crystal lens evaluation through optical measurements
Jessica Onaka[1], Daisuke Koyama[2]
[1]Center for Optical Research and Education (CORE), Utsunomiya University, [2]Faculty of Science and Engineering, Doshisha University
For ultrasonic liquid crystal lenses, the geometry of the lens and the design of the piezoelectric transducer are critical factors. In this work, several optical measurements were used to evaluate the performance of the ultrasound liquid crystal lenses.

OPTM8-02 14:45

Study on laser spot size measurement by scanning-slit method based on back-injection interferometry
Yuanfu Tan
The Chinese University of Hong Kong
In this study, a new spot size measurement device based on laser back-injection interferometry was presented. The photodiode integrated with the laser diode was used to collect the feedback laser, then the laser spot size was calculated by the feedback current. Results show that our spot size measurement device could measure the spot size of 5 laser diode modules both in the x and y direction , which is cost-effective, easy to operate, and accurate.

OPTM8-03 15:00

A Modulation Transfer Function Approach to Fisheye Lens Polarization Aberrations
Manning Sun[1], Nathan Hagen[1], Russell Chipman[2,1], Yukitoshi Otani[1]
[1]Utsunomiya University, [2]Meta, USA.
This study investigates polarization aberrations in fisheye lens imaging. It analyzes the impact of polarizers on the lens's performance and confirms the presence of polarization aberrations in the all field of view imagery through experimental validation. Additionally, MTF analysis is used to quantify the effects of polarization aberrations on image quality, revealing significant impacts on MTF.

OWPT <Room 304>

[OWPTp]

Poster session program p.144

SLPC <Room 416+417>

SLPC7-04 14:15

Free of thermal focus shift optics made of crystal quartz
Alexander Laskin[1], Joerg Volpp[2], Takuji Nara[3]
[1]AdlOptica Optical Systems GmbH, [2]Lulea University of Technology, [3]Profitet
Unique combination of physical properties of crystal quartz provides self-compensation of unwished thermo-optical effects such as focus shift and aberrations, and makes it an athermal optical material for multi-kW optics.

----- Coffee Break 14:30-14:45 -----

[SLPC8] 14:45-15:45
AI / CPS Laser Processing
Chairs: Aiko Narazaki
National Institute of Advanced Industrial Science and Technology
Hitoshi Nakano
Kindai University

SLPC8-01 14:45 ***Invited***

Successful determination of the physical properties of a weld seam - how much information is buried in the sensor signals of a laser welding process?
Markus Kogel-Hollacher[1], Jens Reiser[1], Joachim Schwarz[2], Fabian Mack[1], Thomas Nicolay[3], Stan Watanabe[4]
[1]Precitec GmbH & Co. KG, [2]Precitec Vision GmbH & Co. KG, [3]Precitec Optronik GmbH, [4]Precitec Japan Ltd
The focus of this presentation is on using artificial intelligence algorithms to "make the invisible visible". We will discuss how classified, physical properties can be derived from already reliable process information. Rather than defining complex rules for algorithms, the use of Data Science and Machine Learning methods reveals hidden structures in noisy unstructured data and make it possible to find the relationships of the data to the physical measurement.

SLPC8-02 15:15

Deep Learning Model to Determine Laser Irradiation Conditions for the Formation of Nano-Periodic Structure
Ryouta Masuda, Yoshio Hayasaki, Satoshi Hasegawa
Center for Optical Research and Education, Utsunomiya University
In this study, we constructed a deep learning model predicting scanning electron microscope (SEM) images of nano-periodic structures on silicon substrates corresponding to selected laser irradiation conditions. This learning model enables us to estimate the nano-periodic structures before the processing, which aids in rapid optimization of the laser irradiation conditions.

TILA-LIC <Room 315>

----- Coffee Break 14:15-14:30 -----

[TILA-LIC4] 14:30-16:00
Laser Sources - 1
Chair: Nicolaie Pavel
National Institute for Laser, Plasma and Radiation Physics - INFLPR, Magurele, Romania

TILA-LIC4-01 14:30 ***Invited***

Large core diameter crystal waveguide - a new device for high brightness solid-state lasers
Qiang Li, Shuai Li, Hong Lei, Zhanda Zhu
Beijing University of Technology, China
Large core diameter crystal waveguides are composed of all crystal materials such as yttrium aluminum garnet (YAG), which have better thermodynamic and optical properties than glass fibers. The large core diameter waveguide has a large fundamental mode field area, which has extremely high-power expansion potential, providing a new approach for the development of high brightness solid-state lasers.

TILA-LIC4-02 15:00

High-brightness 480 nm laser for cold-atom-based quantum-computer
Baptiste Bruneteau[1], Hwan Hong Lim[1], Takunori Taira[1,2]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center
This work describes the step-by-step design of a high-brightness laser emitting at 480nm for quantum-computing applications. It presents means to achieve specifications needed by quantum-computer applications in terms of brightness, timing-jitter, energy stability and linewidth.

TILA-LIC4-03 15:15

Output Pulse Control of CW-Pumped Nd:YVO_4/Cr:YAG Microchip Laser
Rakesh Bhandari, Shota Sekiguchi, Xiaomin Wang, Tadashi Hajikano, Yuichi Takushima
Optoquest Co. Ltd.
We report, for the first time, control of the output-pulse-energy characteristics of a CW-pumped, high-repetition-rate Nd:YVO_4/Cr:YAG microchip laser, by using the large reduction of the stimulated emission cross-section of the Nd:YVO_4 crystal on increasing its temperature.

Oral, Wednesday, 24 April PM

ALPS & HEDS & XOPT <Room 303>

ALPS <Room 511+512>

BFSS <Room 413>

BISC <Room 419>

[BISC4] 15:00-16:00
Session 4
Chair: Yasuaki Kumamoto
Osaka University

BISC4-01 15:00

Optimization of All-Optical Physiology by Two-Photon Holographic Microscope for Avoiding Crosstalk Problem

Priyanka Gore[1], Manoj Kumar[2], Naru Yoneda[2], Osamu Matoba[2], Mitsuhiro Morita[1,2]
[1]Department of Biology, Kobe University Graduate School of Science, [2]Center of Optical Scattering imaging Science, Kobe University

All-optical physiology to study neuronal network in the brain through Ca^{2+} imaging and optogenetic stimulation using two-photon holographic microscope was optimized for avoiding crosstalk, which is the artificial activation of opsins by imaging laser.

JS-03 15:15 *Invited*

Study of astrophysical collisionless shocks in the laboratory

Hye-Sook Park[1], Eleanor R. Tubman[2], Frederico Fiuza[3], Drew P. Higginson[1], David J. Larson[1], Mario Manuel[4], Kasper Moczulski[5], Michael Pokornik[6], Bradley B. Pollock[1], George F. Swadling[1], Petros Tzeferacos[5]
[1]Lawrence Livermore National Laboratory, Livermore, CA USA, [2]Imerial College, London, UK, [3]Instituto Superior Tecnico, Lisbon, Portugal, [4]General Atomics, Sandiego, CA, USA, [5]University of Rochester, Rochester, NY, USA, [6]University of California, San Deigo, CA, USA

High Mach number astrophysical plasmas creates collisionless shocks via plasma instabilities that are responsible for cosmic ray acceleration. A series of laboratory experiments were conducted on Omega and the National Ignition Facility to observe: the Weibel instability; collisionless shock formation; and electron acceleration. In addition to the case of unmagnetized condition, shock formation under magnetized environment is also being studied.

ALPS19-02 15:15

Yb:fiber laser comb on silica in 1 GHz line spacing

Ruoao Yang, Duo Pan, Jingbiao Chen, Aimin Wang, Zhigang Zhang
Peking University

We demonstrated a compact and integrated Yb:fiber laser frequency comb bonded on fused silica bricks in 1 GHz mode spacing. A signal-to-ratio of > 45 dB of f_{CEO} was stabilized over days.

BISC4-02 15:15

***In-vivo* intelligent fluorescence sectioning using meta-varifocal endo-microscopy**

Yu-Hsin Chia[1,2], Cheng Hung Chu[3], Sunil Vyas[2], Yi-You Huang[1,2,4], Din Ping Tsai[5,6,7], Yuan Luo[2,3,8]
[1]Department of Biomedical Engineering, National Taiwan University, Taipei, 10051, Taiwan, [2]Institute of Medical Device and Imaging, National Taiwan University, Taipei, 10051, Taiwan, [3]YongLin Institute of Health, National Taiwan University, Taipei, 10087, Taiwan, [4]Department of Biomedical Engineering, National Taiwan University Hospital, Taipei, 10051, Taiwan, [5]Department of Electrical Engineering, City University of Hong Kong, Kowloon 999077, Hong Kong, [6]Centre for Biosystems, Neuroscience and Nanotechnology, City University of Hong Kong, Kowloon, 999077, Hong Kong, [7]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, Kowloon, 999077, Hong Kong, [8]Program for Precision Health and Intelligent Medicine, National Taiwan University, Taipei, 106319, Taiwan

Here, we propose an in-vivo intelligent fluorescence sectioning using meta-varifocal endo-microscopy. With the telecentric design, the endo-microscopy can provide constant magnification during axial scanning for in-vivo 3D imaging of mouse brains. Furthermore, we introduce the deep learning (DL) network for HiLo sectioning technique, which can substantially reduce image acquisition time and system complexity.

ALPS19-03 15:30

Pedestal-suppressed spectral peak generation and amplification using nonlinear fiber loop mirror with molecular gas cell and fiber Raman amplifier

Norihiko Nishizawa, Yui Ozawa, Shotaro Kitajima
Nagoya University

Pedestal suppressed, intense spectral peak generation was demonstrated using nonlinear fiber loop mirror with gas cell and fiber Raman amplifier. Intense spectral peak with 1 mW average power and 45 dB SBR was generated successfully.

BISC4-03 15:30 *Invited*

Ultrathin Endoscopy for the Detection of Vessel Blocks

Yongkang Zhang, Zhixiang Zhang, Lipei Song
Nankai University

Stroke is one of the leading courses of death and disabilities. Various researches have been focusing on the detection and treatment of it. However, current imaging methods for detecting stroke have either limited resolution or tip size, because of which they are not suitable for small vessels that are important in the research on stroke treatment. We developed an ultrathin endoscopy method to image the blocks in vessels of a couple of microns in diameter.

[BFSS-CL] 15:45-15:55
Closing Remarks
Chair: Rie H. Kang
GPI

Oral, Wednesday, 24 April PM

ICNN <Room 414+415>

ICNN8-05 15:00

Novel Applications of Binocular Meta-lens

Xiaoyuan Liu[1,2], Mu Ku Chen[1,2,3], Takuo Tanaka[4,5,6], Din Ping Tsai[1,2,3]
[1]Department of Electrical Engineering, City University of Hong Kong, [2]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, [3]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [4]Innovative Photon Manipulation Research Team, RIKEN Center for Advanced Photonics, [5]Metamaterial Laboratory, RIKEN Cluster for Pioneering Research, [6]Institute of Post-LED Photonics, Tokushima University

We have developed a series of intelligent binocular meta-lens systems with novel applications of particle image velocimetry, underwater stereo vision, edge-enhanced depth perception for ill-posed regions, and assisted driving vision.

[ICNN-CL] 15:15-15:25
Closing Remarks
Chair: Shinji Matsuo
NTT

IP <Room 302>

[IP4] 15:00-15:45
Fourier Optics / Device
Chairs: Eriko Watanabe
The University of Electro-Communications
Suguru Shimomura
Osaka University

IP4-01 15:00

Design of quantum dot networks for improving the performance of reservoir computing

Kazuki Yamanouchi, Suguru Shimomura, Jun Tanida
Osaka University

We designed Quantum dot networks (QDNs) with effective fluorescence signals for improving the performance of the QD reservoir computing. The signal diversity of the designed QDNs and the prediction performance of time-series data were evaluated.

IP4-02 15:15

Vortices in two-point correlation function

Akanksha Gautam, Rakesh Kumar Singh
Indian Institute of Technology, BHU, Varanasi

We present a method to generate a helical phase structure in two-point correlation function using the polarization basis of light. The method is based on the van Cittert–Zernike theorem, establishing a connection between an incoherent source and the two-point correlation function in the far-field. Experimental measurement of the helical phase in the two-point complex correlation function is carried out by a radial shearing interferometer.

IP4-03 15:30

Single-shot digital holographic reconstruction based on iterative phase retrieval framework with adaptive constraints

Danlin Xu, Zhengzhong Huang, Liangcai Cao
Department of Precision Instruments, Tsinghua University

An advanced iterative phase retrieval method for single-shot in-line digital holographic imaging is proposed. The incorporation of adaptive constraints generated by morphological filtering permits high-fidelity reconstruction and optimized convergence behavior.

Oral, Wednesday, 24 April PM

LEDIA <Room 211+212>

LEDIA3-02 15:30

Aperture dimeter dependences of highly efficient GaN VCSELs with well-controlled cavity lengths

Mitsuki Yanagawa, Ruka Watanabe, Kenta Kobayashi, Taichi Nisikawa, Tetsuya Takeuchi, Satoshi Kamiyama, Motoaki Iwaya
Meijo University

We demonstrated highly efficient GaN VCSELs with well-controlled cavity lengths by a combination of in situ and ex situ controls. More than 20% wall plug efficiency and 10mW light output power were obtained from a 5-μm aperture VCSELs.

LEDIA3-03 15:45

Epitaxial growths of highly efficient GaN VCSELs with in situ cavity length control and GaInN underlaying layers

Taichi Nishikawa, Kenta Kobayashi, Ruka Watanabe, Mitsuki Yanagawa, Tetsuya Takeuchi, Satoshi Kamiyama, Motoaki Iwaya
Meijo University

We established epitaxial growths of highly efficient GaN VCSELs by using in situ thickness control technique and GaInN underlying layers. The VCSEL wafer resulted in more than 20% wall plug efficiency and 10mW light output power.

LSC <Room 421>

LSC2-03 15:20 *Invited*

Ultrafast and ultrasmall: all-optical switching of magnetization

Clemens von Korff Schmising
Max Born Institut, Berlin

We combine laboratory and FEL-based experiments to explore the fundamental temporal and spatial limits of all-optical magnetization reversal in GdFe alloys. We find write/erase-cycles of <7 ps and magnetic bit size down to 25 nm.

LSC2-04 15:40

Development of a high-order harmonic generation apparatus using in-house ultrashort pulse laser for spin-dynamics measurements

Yuto Shiokawa[1], Ryunosuke Takahashi[1], Suguru Nakata[1], Nobuhisa Ishii[2], Hiroki Wadati[1,3]
[1]University of Hyogo, [2]QST, [3]Institute of Laser Engineering, Osaka University

High-order harmonic generation (HHG) in the extreme ultraviolet (XUV) wavelength region is generated by focusing intense femtosecond laser pulses onto a gas. This technique is also beneficial because the UXV can be generated with relatively small laboratory-scale equipment. In this talk, we will report on the observation of HHG using an ultrashort pulsed infrared laser as a light source.

LSSE <Room 316>

[LSSE7] 15:30-16:00
Agri-Photonics 2
Chair: Shigeharu Moriya
RIKEN

LSSE7-01 15:30 *Invited*

Characterization of plant mutants using photonics technologies

Tomoki Matsuyama, Norihito Saito, Satoshi Wada
RIKEN Center for Advanced Photonics

We have generated plant mutants using physical mutagens such as ion-beams. In this study, we will demonstrate photonics technology to discover the hidden traits of the resulting mutants and develop them into agriculturally useful cultivars.

OMC <Room 418>

OMC8-03 15:30

Mode conversion of high-peak-power and high-order structured pulsed beams in a near-hemispherical cavity

Pi-Hui Tuan, Shu-Cheng Liu
National Chung Cheng University

Beam transformation of high-order and high-peak-power structured pulses created by an Nd:YVO_4/Cr^{4+}:YAG laser in a near-hemispherical cavity is explored to offer complex pulsed fields with diverse phase singularity arrays for potential applications.

OMC8-04 15:45

Fabrication of helical polymeric structures using an optical vortex

Kenta Homma[1], Yasushi Tanimoto[2], Kyoko Masui[2], Ryosuke Isobe[1], Yoshihisa Matsumoto[2], Chie Hosokawa[2], Takashige Omatsu[3], Michiya Matsusaki[1]
[1]Osaka University, [2]Osaka Metropolitan University, [3]Chiba University

Helical structures are abundant in our body. Yet, the effects of helical structures on tissue functions remain elusive. Herein, we utilized an optical vortex to fabricate biocompatible polymeric scaffolds with helical structures via photo-initiated radical polymerization chemistry. Helical scaffolds may provide a novel means to investigate how helical structures affect tissue functions.

Oral, Wednesday, 24 April PM

SLPC <Room 416+417> | TILA-LIC <Room 315>

SLPC8-03 15:30

Prediction of the Laser Absorption Threshold Using Deep MLP-CNN Model in Laser Cleaning

Konika Rani, Norimasa Ozaki, Kazumune Hashimoto, Ryosuke Kodama, Yoshihiro Miyake, Hirotaka Nakamura, Hideo Nagatomo
Osaka University

Our research presents a novel hybrid model (MLP-CNN) designed for predicting the laser absorption threshold of various materials in laser cleaning techniques. This pioneering research offers significant contributions for future predictive modeling in laser-material interactions, with potential applications extending to materials engineering and laser surface processing.

TILA-LIC4-04 15:30 *Invited*

Ultrafast 1-µm waveguide lasers and their phase noise and timing jitter characteristics

Fabian Rotermund
KAIST, South Korea

We demonstrate ultrafast mode-locked low-noise waveguide lasers operating at GHz-level fundamental repetition rates. Femtosecond-laser-inscribed Yb:KLuW channel waveguide lasers with tunable cavity lengths generate femtosecond pulses near 1030 nm. Their timing jitter and phase noise characteristics with varied cavity parameters will be reported in this talk.

Oral, Thursday, 25 April AM

ALPS <Room 303>

[ALPS20] 9:00-10:15
Optical frequency combs / Frequency stabilized lasers and applications (3)
Chair: Naoya Kuse
Tokushima Univ.

ALPS20-01 9:00 ***Invited***

Centre of Excellence in Optical Microcombs for Breakthrough Science: a new wave of photonic solutions
Arnan Mitchell
RMIT University
This talk will introduce our newly established research centre exploring the science and technology of optical microcombs and particularly the diverse applications that accessible, reliable, and low-cost photonic chip frequency combs can enable.

ALPS20-02 9:30

Decision making using a chaotic microresonator frequency comb
Jonathan Cuevas[1], Ryugo Iwami[2], Atsushi Uchida[2], Kaoru Minoshima[1,3], Naoya Kuse[1]
[1]Tokushima University, [2]Saitama University, [3]The University of Electro-Communications
We introduce and showcase the application of a chaotic microresonator frequency comb in resolving multi-armed bandit problems, employing its comb modes to create a series of temporal chaotic waveforms.

ALPS20-03 9:45

Experimental and numerical investigation of blue- and red-detuned dissipative Kerr solitons in coupled-microresonators
Kenji Nishimoto[1], Kaoru Minoshima[2], Naoya Kuse[3]
[1]Tokushima University, [2]The University of Electro-Communications, [3]Institute of Post LED Photonics
We explore blue- and red-detuned dissipative Kerr soliton generation in coupled-ring microresonator with avoided mode crossing at the pump mode, achieving enhanced power efficiency and spectral broadening.

ALPS <Room 511+512>

[ALPS24] 9:15-10:15
Quantum optics and their applications (1)
Chair: Ryo Okamoto
Kyoto University

ALPS24-02 9:45

Biphoton spectral reconstruction with delay-line-anode single-photon imagers
Ozora Iso[1], Kensuke Miyajima[2], Ryosuke Shimizu[1]
[1]The University of Electro-Communications UEC, [2]Tokyo University of Science TUS
We report the biphoton spectrum measurement with two delay-line-anode single-photon imagers. The system acquired picosecond-scale temporal information and achieved an efficient measurement time without the pixel-scanning procedure.

ALPS24-03 10:00

Pathway selectivity in time-resolved spectroscopy by coincidence counting of quantum entangled photons
Yuta Fujihashi[1], Akihito Ishizaki[2,3], Ryosuke Shimizu[1]
[1]The University of Electro-Communications, [2]Institute for Molecular Science, [3]SOKENDAI
We theoretically propose time-resolved spectroscopy based on the coincidence counting of entangled photon pairs. We demonstrate that the use of two-photon counting detection enables the selective elimination of the excited-state absorption signal.

BISC <Room 419>

[BISC5] 9:00-10:15
Session 5
Chair: Tom Vettenburg
University of Dundee

BISC5-01 9:00

Diattenuation imaging of artificial and biological samplesusing polarization-structured spot array
Taiki Suzaki, Yusuke Ogura, Jun Tanida
Osaka University
In this study, we aim to develop a polarization imaging method, using a polarization-structured spot array as illumination. To assess the capability, we measured the diattenuation distribution of artificial and biological objects as samples. Experimental results demonstrated that our method is effective to measure diattenuation in a single shot.

BISC5-02 9:15

Plasmonic imaging for transparent nanoparticle characterization
Wei-Chuan Shih
University of Houston
Characterization of transparent nanoparticles faces fundamental challenges in resolution and detection. We demonstrate <u>P</u>l<u>A</u>smonic <u>N</u>an<u>O</u>-ape<u>R</u>ture l<u>A</u>bel-free i<u>MA</u>ging (PANORAMA) for single exosome counting and profiling in the context of early cancer detection and diagnosis.

BISC5-03 9:30

The Modified SE(2) CNN: Geometric Deep Learning for Classifying Magnetic Resonance Imaging of Brain Tumor
Clara Lavita Angelina[1,2], Sunil Vyas[3], Fu Ren Xiao[3], Yuan Luo[3,4,5], Hsuan Ting Chang[1,2]
[1]Department of Electrical Engineering, National Yunlin University of Science and Technology, [2]Graduate School of Engineering Science and Technology, National Yunlin University of Science and Technology, [3]Institution of Medical Device and Imaging, National Taiwan University, [4]YougLin Institute of Health, National Taiwan University, [5]Program for Precision Health and Intelligent Medicine, National Taiwan University
Early-stage brain tumor detection is crucial for survival. This research uses a modified SE(2) CNN for MRI brain tumor categorization. Trained on 2611 scans in five classes, the model excels in binary classification, especially in AVM vs. non-AVM, with high accuracy and F1 score. It also identifies Meningioma, Pituitary, Metastases, and Schwannoma, with metrics over 0.5.

BISC5-04 9:45 ***Invited***

Enhanced High-Speed Three-Photon Fluorescence Imaging by Optimized Cr:Forsterite Laser
Shih-Hsuan Chia, Chen Chi-Wen, Je-Chi Jang
National Yang Min Chiao Tung University, Taiwan
This manuscript reports on the utilization of a Cr:Forsterite laser for high-speed three-photon fluorescence imaging in transgenic fruit flies. Through this approach, we achieved a remarkable tenfold increase in signal-to-background ratio at various depths, facilitating whole brain imaging in comparison to conventional two-photon methods.

Oral, Thursday, 25 April AM

HEDS <Room 311+312>

[HEDS7] 9:00-10:05
Particle Acceleration 1
Chair: Yasuhiro Kuramitsu
Osaka University

HEDS7-01 9:00 *Invited*

On parallels and anti-parallels (the similarities and differences) between particle acceleration in space and in laser plasma

Sergey Bulanov
Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Za Radnici 835, 25241 Dolni Brezany, Czech Republic

The talk is devoted to the prospects of using the laser radiation interaction with plasmas in the laboratory relativistic astrophysics context. We discuss basic features of charged particle acceleration during magnetic field line reconnection and at the shock wave front when the radiation friction effects become dominant.

HEDS7-02 9:40 *Invited*

Investigating ion acceleration at radiation pressure driven shocks using mid-IR lasers

Nicholas Dover[1], Oliver Ettlinger[1], Marcus Babzien[2], Mikhail Polyanskiy[2], Igor Pogorelsky[2], Zulfikar Najmudin[1]
[1]The John Adams Institute for Accelerator Science, Imperial College London, [2]Accelerator Test Facility, Brookhaven National Laboratory

We will discuss recent experiments using a high power mid-IR laser to irradiate near-critical density plasma. We investigated radiation pressure and collisionless shockwave acceleration, laser channelling, and the formation of Weibel-like electron beam filaments.

IP <Room 414+415>

[IP5] 9:15-10:30
Computational Imaging 1
Chair: Yasuhiro Mizutani
Osaka University

IP5-01 9:15 *Invited*

Artificial Neural Network in Lensless Computational Imaging

Chung-Hao Tien
National Yang Ming Chiao Tung University

Lensless imaging provides an alternative to imaging system, thereby reducing the cost and form factor. In this study, we exploited the advantages of deep neural networks (DNNs) to perform multiple downstream visual tasks, including scene reconstruction and face recognition for modulated scenes.

IP5-02 9:45

Wavefront sensing with single pixel imaging

Naohiro Kobayashi, Keito Kiyama, Kouichi Nitta, Osamu Matoba
Kobe University

Single pixel imaging is applied to a Shack Hartmann type wavefront sensor. An experimental system for the proposed method is constructed and verified. From experimental results, it is confirmed that the constructed system provides a desired set of spot patterns.

LDC <Room 301>

[LDC8] 9:00-10:45
Novel and Emerging Technologies
Chairs: Masato Ishino
Osaka Univ.
Martin Pfennigbauer
RIEGL

LDC8-01 9:00 *Invited*

New developments of laser beam application equipment From laser show content to bird prevention

Okudaira Yoshihiro
VenusLaser inc.

Introduces the latest applications and potential of laser beam technology, extending from the entertainment to the agricultural sector.

LDC8-02 9:30 *Invited*

Research activities on free-space and underwater optical communications

Yoshihisa Takayama
Tokai University

The progresses of free-space optical communications and underwater optical communications are presented with focusing on the used wavelengths. The impact on optical communication systems when the fluctuating field becomes a signal path is explained.

LEDIA <Room 211+212>

[LEDIA4] 9:00-10:30
u-LED others
Chair: S. Ichikawa
Osaka University

LEDIA4-01 9:00

Dependence of stray light in monolithic GaInN-based μLED arrays on sapphire substrate thickness

Naoki Hasegawa, Tatsunari Saito, Yoshinobu Suehiro, Satoshi Kamiyama, Motoaki Iwaya, Tetsuya Takeuchi
Meijo University

Stacked GaInN-based monolithic LED arrays are expected to be applied to AR/VR displays because of their high integration and high brightness.Therefore, it is necessary to take appropriate countermeasures against stray light. In this study, we investigated the dependence of stray light on sapphire substrate thickness. As a result, we confirmed that changing the sapphire substrate film thickness of the elements causes a large difference in stray light patterns.

LEDIA4-02 9:15

Heterogeneous Integration of InGaN micro-LED Display and Shift-Register IC Chips

Hao Lyu, Hoi Wai Choi
The University of Hong Kong

This work reports on the heterogeneous integration of a GaN-on-Si micro-LED display with shift-registers at the chip-level, effectively reducing the number of pinouts.

LEDIA4-03 9:30

Low Level Light Device Combined with Electromagnetic Fields for Alopecia Therapy

Po-Wen Wang, Cheng-Yang Liu
National Yang Ming Chiao Tung University

This study indicates that laser or light-emitting diode (LED) light treatments are suitable to enhance hair growth. Furthermore, we present the combination of LED and electromagnetic fields (EMF) stimulations for better treatment results of alopecia. The thicknesses of new hair and hair follicles have both enlarged. The new hairs have a slower growth period for the quantity; however, they have also sprouted and formed a denser spread in the forehead.

LEDIA4-04 9:45

Deep and Shallow Etching of AlGaN/GaN Heterostructures using Contactless Photo-electrochemical (CL-PEC) Technique

Y. Oki, T. Togashi, N. Shiozawa, R. Ochi, T. Sato
Research Center for Integrated Quantum Electronics, Hokkaido University

Contactless photo-electrochemical (CL-PEC) etching is performed by immersing a sample with a cathode pad in a solution containing an oxidant and irradiating it with ultra-violet (UV) light. It is very simple set-up and is one of the most promising wet etching techniques for nitride semiconductors such as GaN and AlGaN. In this study, we have demonstrated the deep and shallow etching of AlGaN/GaN structures by optimizing the CL-PEC conditions.

Oral, Thursday, 25 April AM

LSC <Room 421>

[LSC3] 9:00-10:15
Photoemission, absorption, scattering (1)
Chair: Takeshi Suzuki
University of Tokyo

LSC3-01 9:00 ***Invited***

Fermi surface nesting driving the RKKY interaction in centrosymmetric skyrmion magnets.
Takeshi Kondo
ISSP, University of Tokyo
Magnetic skyrmions are topologically non-trivial particles with swirling spin texture in real space. In recent years, the topological state has been gaining tremendous attention as a next-generation medium leading toward future spintronic applications. We present the first observation of the intrinsic electronic structure of the most well-acknowledged centrosymmetric skyrmion magnets by ARPES.

LSC3-02 9:20 ***Invited***

Spin- and angle-resolved photoemission spectroscopy on Bi-based high-temperature cuprate superconductors
Hideaki Iwasawa
National Institutes for Quantum Science and Technology
We will present a spin-resolved ARPES study on Bi-based high-T_c cuprate superconductors. The results call for a revision of the simple application of the spin-orbit interaction within the standard framework of the Rashba interaction.

LSC3-03 9:40 ***Invited***

Time- and angle-resolved photoemission spectroscopy for nonequilibrium excitonic state in bulk WSe_2
Katsuya Oguri[1], Ryo Yoshioka[1,2], Kohei Nagai[1], Yashushi Shinohara[1], Takuya Okamoto[1], Yoji Kunihashi[1], Keiko Kato[3], Hiroki Mashiko[4], Yoshiaki Sekine[1], Hiroki Hibino[5], Ikufumi Katayama[2], Jun Takeda[2], Haruki Sanada[1]
[1]NTT Basic Research Labs., NTT Corporation, [2]Yokohama National University, [3]Nagoya University, [4]The University of Tokyo, [5]Kwansei Gakuin University
We report an observation of the dynamical behavior of exciton generated at the K point during the optical excitation and the intervalley scattering in layered 2H- WSe_2 by using Tr-ARPES with 30-fs near infrared pump pulse.

LSSE <Room 316>

[LSSE8] 9:17-10:47
Space Technology 1
Chairs: Toshikazu Ebisuzaki
RIKEN
Tadanori Fukushima
Orbital Lasers

LSSE8-01 9:17 ***Invited***

Contribution of Nanosecond Pulse Laser Development for the Capture and Removal of Space Debris
Kazuki Matsuo
EX-Fusion Inc.
With the recent technological advancements in lasers, especially the enhancement of high-power pulse lasers, the possibility of using ground-based lasers to capture and remove space debris has become increasingly feasible. This presentation will provide an overview of the required performance.

LSSE8-02 9:47 ***Invited***

Free Space OptComm as a Solution for Further Growth of the Earth Observation Industry
Hirokazu Mori
WARPSPACE CSO
This presentation intends to introduce the Earth observation (EO) industry and use cases of EO data, the bottleneck in the EO industry, and free space optical communication technology as one of the solutions.

OMC <Room 418>

[OMC9] 9:00-10:15
Session 7
Chairs: Keiji Sasaki
Hokkaido University
Sile Nic Chormaic
OIST

OMC9-01 9:00 ***Invited***

Sculpted light in quantum and bio.
Halina Rubinsztein-Dunlop
The University of Queensland
Sculpted light has emerged as the tool of choice to produce configurable and flexible confining potentials at the nano- and micro-scale. Applications of sculpted light range from imaging, quantum devices and sensors, quantum atom optics, and optical tweezers. It provides means of production of ever more complex potential landscapes. Highly versatile sculpted light can be produced using spatial light modulators (SLMs) or digital micromirror devices (DMD).

OMC9-02 9:30

Detection of a variety of DNA sequences via optical condensation of multiple-sized particles at the solid-liquid interface
Shuichi Toyouchi[1,2], Seiya Oomachi[1,2,3], Ryoma Hasegawa[1,2,3], Kota Hayashi[1,2,3], Yumiko Takagi[1,2], Mamoru Tamura[1,4], Shiho Tokonami[1,3], Takuya Iida[1,2]
[1]Osaka Metropolitan University, RILACS, [2]Osaka Metropolitan University, Department of Physics, Graduate School of Science, [3]Osaka Metropolitan University, Department of Applied Chemistry, Graduate School of Engineering, [4]Osaka University, Department of Material Engineering Science, Graduate School of Engineering Science
We reveal that light-induced acceleration of DNA hybridization can be accelerated by optical condensation of multiple-sized particles modified with probe DNA and target DNA at solid-liquid interface. By applying this mechanism, we detected a single mutation in DNA with just 5 minutes of light irradiation. The obtained results provide a rapid, sensitive, and cost-effective analysis of a variety of DNA sequences using optical force and photothermal effect.

OMC9-03 9:45

Circular dichroism of chiral plasmonic nanoparticles dispersed in solution grown by circularly polarized light
Koichiro Saito, Yoshie Ishikawa
National Institute of Advanced Industrial Science and Technology (AIST)
In this study, we report on the chirality of a dispersion of gold nanorods with silver grown on the surface (AuNR@Ag) by circularly polarized light. The AuNR@Ag dispersions synthesized by left and right circularly polarized light showed circularly dichroism spectra that were roughly symmetrical to each other. Since the AuNR@Ag are dispersed in solution, the result suggest that three-dimensional chiral silver nanostructures have grown on the AuNR.

OWPT <Room 304>

[OWPT5] 9:30-10:30
Session 5
Chair: Noriyuki Yokouchi
Furukawa Electric

OWPT5-01 9:30 ***Invited***

Power-over-Fiber Applied for In-Flight Entertainment System
Joao Batista Rosolem[1], João Roberto Nogueira Júnior[1], Fábio Renato Bassan[1], Carla Cristiane Furoni[1], Alexandre Barbosa dos Santos[2], Leonardo Martins Wollinger[2], Pedro Jun Nagano[2], Jose Juliano Fioretto[2], Luiz Augusto Rodrigues Nerosky[2], Marcelo Prado de Oliveira[2]
[1]CPQD - Research and Development Center in Telecommunications, [2]Embraer
This work describes a video and power transmission system using optical fibers (PoF) for in-flight entertainment system applications. In the experimental demonstration it was used a laser with 12 W optical power operating at 808 nm. Two GaAs photovoltaic converters were used to produce electrical energy for one video monitor and one optical video receiver. The power and video signals were transmitted using two 50-m multimode fibers.

Oral, Thursday, 25 April AM

SLPC <Room 416+417>

[SLPC9] 9:00-10:15
Cladding / Laser Metal Depostion/ Cutting and Cleaning
Chairs: Yasuhiro Okamoto
Okayama University
Yorihiro Yamashita
National Institute of Technology, Ishikawa College

SLPC9-01 9:00 ***Invited***

Laser Cladding of WC-CrMnFeCoNi HEA Cemented Carbides
Takahiro Kunimine[1], Kaito Ebihara[1], Tatsuya Sakurai[1], Yorihiro Yamashita[2]
[1]Kanazawa University, [2]National Institute of Technology, Ishikawa College
A high-entropy alloy (HEA) was applied to an alternative binder for the WC-Co cemented carbide as an attempt to seek enhanced mechanical properties. In the experiment, a CrMnFeCoNi HEA, which was the most well-known HEA, powder was used as a binder to fabricate WC-HEA cemented carbides by multi-beam laser directed energy deposition (L-DED).

SLPC9-02 9:30

Application of Laser Metal Deposition to Brittle Brazing Filler Metal Powder Feeding Method
Kotaro Matsu, Yoshihisa Sechi, Kohei Fukuda
Tokyo Braze Co., Ltd.
Brittle brazing alloys such as nickel alloy are difficult to process. So, we have applied laser metal deposition as a brittle brazing filler metal powder feeding method and evaluated the brazeability of the joints.

SLPC9-03 9:45

Development of fuel cell bipolar plate manufacturing laser system and research on cutting performance
Su Jin Lee[1], Jung-Lo Yoon[1], Goo Cheol Kwon[2], In Duck Park[1]
[1]Korea istitute of Machinery & Materials, [2]K-lab Laser&Control
Recently, various eco-friendly energy technologies are being developed, and especially fuel cell technology is attracting attention because of eco-friendly and highly efficient. It is being developed and utilized in a variety of ways, including fuel cells for buildings, power generation, and transportation, and in particular, the spread of fuel cells used in transportation devices such as automobiles, ships, and aircraft is expected to increase.

TILA-LIC <Room 315>

[TILA-LIC5] 8:30-10:15
PLENARY SESSION & TUTORIAL
Chair: Takunori Taira
RIKEN SPring-8 Center, Sayo-gun, Japan

TILA-LIC5-01 8:30 ***Invited***

TBD
Franz Kärtner
University of Hamburg, DESY, Hamburg, Germany
TBD

TILA-LIC5-02 9:30 ***Invited***

The Nonplanar Ring Oscillator at Forty
Thomas J Kane
Independent optical engineer
The history of the nonplanar ring oscillator (NPRO) will be described, from its conception 1983 through its ongoing role in the detection of gravitational waves on Earth and in space.

XOPT <Room 313+314>

[XOPT6] 9:00-10:30
Imaging1
Chair: Takashi Kimura
The University of Tokyo

XOPT6-01 9:00 ***Invited***

X-ray Spectroscopic Ptychography: Current Status and Future Perspectives
Yukio Takahashi[1,2]
[1]Tohoku University, [2]RIKEN SPring-8 Center
X-ray spectroscopic ptychography, which combines X-ray ptychography and X-ray absorption fine structure spectroscopy, is a promising tool for visualizing both the structure and chemical state of bulk materials at the nanoscale. High-resolution X-ray spectroscopic ptychography measument system developed at SPring-8 and its applications will be introduced, and the prospects for the use of NanoTerasu will be discussed.

XOPT6-02 9:30 ***Invited***

Ptychography at MAX IV studying samples, beams and optics
Maik Kahnt[1], Ulf Johansson[1], Sebastian Kalbfleisch[1], Ann E. Terry[1], Antara Pal[1,2], Mikhail Lyubomirskiy[3], Louisa Pickworth[1], Jörg Schwenke[1], Igor Beinik[1], Rebecka Lexelius[4], Karina Thånell[1]
[1]MAX IV Laboratory, Lund University, [2]Department of Chemistry, Physical and theoretical Chemistry, Lund University, [3]Center for X-ray and Nano Science CXNS, Deutsches Elektronen-Synchrotron DESY, [4]Laboratory of Molecular Biophysics, Department of Cell and Molecular Biology Uppsala University
We present how we use X-ray ptychography to study samples, the X-ray beams properties and the X-ray optics used to create it.

Oral, Thursday, 25 April AM

ALPS <Room 303>

ALPS20-04 10:00

Microresonator soliton frequency combs via cascaded Brillouin scattering

Hao Zhang[1,2], Shuangyou Zhang[2], Toby Bi[2,3], George Ghalanos[2], Yaojing Zhang[2], Haochen Yan[2,3], Arghadeep Pal[2,3], Jijun He[1], Shilong Pan[1], Pascal Del'Haye[2,3]
[1]National Key Laboratory of Microwave Photonics, Nanjing University of Aeronautics and Astronautics, [2]Max Planck Institute for the Science of Light, [3]Department of Physics, Friedrich Alexander University Erlangen-Nuremberg

We present Kerr soliton generation via a forward propagating second order Brillouin scattering process in a microresonator. The solitons repetition rates are independent from the Brillouin gain frequency shift (~10 GHz in fused silica).

----- Coffee Break 10:15-10:30 -----

[ALPSp2] 10:30-12:00
ALPS Poster Session 2
<Exhibition Hall A>

Poster session program p.145-

ALPS <Room 511+512>

----- Coffee Break 10:15-10:30 -----

BFSS

[BFSSp] 10:30-12:00
BFSS Poster Session
<Exhibition Hall A>

Poster session program p.148

BISC <Room 419>

----- Coffee Break 10:15-10:45 -----

[BISC6] 10:45-12:15
Session 6
Chair: Yasuhiro Awatsuji
Kyoto Institute of Technology

BISC6-01 10:45 ***Invited***

Quantitative Phase Microscopy with Partially Spatially Coherent Light: Ultra-high Spatial Phase Sensitivity and Large Space Bandwidth Product

Dalip Singh Mehta
Indian Institute of Technology Delhi, India

We report coherent-noise free phase microscopy with an order of magnitude improved spatial phase sensitivity, space-bandwidth product and high stability. The technique was utilized for sperm cells, macrophages, and RBCs for precise phase measurement.

Oral, Thursday, 25 April AM

HEDS <Room 311+312>

----- Coffee Break 10:05-10:25 -----

[HEDS8] 10:25-11:50
Particle Acceleration 2
Chair: Sergei Bulanov
ELI-BL

HEDS8-01 10:25 ***Invited***

Theoretical modelling of ion acceleration by kJ petawatt lasers with long-pulse and large-spot effects
Natsumi Iwata
Institute of Laser Engineering, Osaka University
We present a model to describe enhanced ion acceleration by kJ petawatt lasers. We derive the condition that the sheath acceleration field strength is maintained constant without depletion owing to the long-pulse and large-spot effects.

HEDS8-02 10:50

Undepleted Direct Laser Acceleration
Ishay Pomerantz[1], Itamar Cohen[1], Talia Meir[1], Kavin Tangtartharakul[2], Lior Perelmutter[1], Michal Elkind[1], Assaf Levanon[1], Alexey V Arefiev[2]
[1]The School of Physics and Astronomy, Tel Aviv University, Tel-Aviv, 6997801, Israel, [2]Department of Mechanical and Aerospace Engineering, University of California San Diego, La Jolla, 92093, CA, USA
I will report on our recent discovery that Direct Laser Acceleration of electrons in low-atomic number plasmas, leads to inefficient acceleration due to premature depletion of the target of its ionization electrons.

IP <Room 414+415>

IP5-03 10:00

Anisotropic Scattering Imaging with Multi-Channel Ghost Imaging
Shoma Kataoka, Yasuhiro Mizutani, Kentaro Oda, Tsutomu Uenohara, Yasuhiro Takaya
Osaka University
Our proposed multi-channel ghost imaging (MCGI) obtains the anisotropic scattered light distribution by performing GI from multiple angles with numerous detectors. The reconstructed images with each detector correspond to the scattering distribution of the angle.

IP5-04 10:15

Single pixel magnetic-field imaging with optically pumped magnetometer
Shuji Taue[1], Yuta Takizawa[1], Reiji Okawa[1], Yukinobu Hoshino[1], Teruyoshi Sasayama[2]
[1]Kochi University of Technology, [2]Kyushu University
We demonstrate magnetic field imaging from magnetic nanoparticles. An optically pumped magnetometer is used to detect an excitation field and a signal field from the particles. The magnetic field images was acquired using the single pixel imaging technique with a digital micro-mirror device. The signal field images clearly show the positions of the particles.

----- Coffee Break 10:30-11:00 -----

LDC <Room 301>

LDC8-03 10:00 ***Invited***

Latest developments on Airborne LiDAR Bathymetry - technology and applications
Martin Pfennigbauer[1], Koichi Sasaki[2], Ursula Riegl[1], Marcos Garcia[3]
[1]RIEGL Research Forschungsgesellschaft mbH, [2]RIEGL Japan LTD, [3]RIEGL Asia Pacific Ltd
Bathymetric LiDAR enables the efficient surveying of coastal zones, riverine environments and lakeshores with high spatial resolution and accuracy. An overview of the employed technologies and the achievable performance for different applications is provided.

LDC8-04 10:30

Laser beam shooting technology for physical pest control
Naohisa Yamamoto, Soichiro Nishiguchi, Hiroshi Fuji, Kana Fujioka, Kazuhisa Yamamoto
Institute of Laser Engineering
Last year, we proposed a physical pest control system using a semiconductor laser and camera. This system does not require pesticides.This system detects the moth's flying position using camera and fires a laser pulse beam at that position to shoot the moth . In this presentation, we attempted to speed up the tracking system to ensure that the beam is focused on the target of detection.

----- Coffee Break 10:45-11:00 -----

LEDIA <Room 211+212>

LEDIA4-05 10:00

Development of MicroLED film with vertical current injection structure
R. Kanda[1], T. Kitade[1], A. Nishikawa[2], A. Loesing[2], H. Sekiguchi[1]
[1]Toyohashi Tech, [2]ALLOS
By establishing the transfer process of GaN MicroLED array onto conductive materials, the MicroLED film with vertical current injection structure was realized.

LEDIA4-06 10:15

Operation Performance Size Dependence of Electroluminescent Quantum Dots Micro-LED Arrays
ChungKai Chi[1], Chien-Lin Lin[1], Jing-Teng Shi[2], Chih-En Chang[1], Hsin-Chieh Yu[2,3]
[1]Institute of Photonic System, College of Photonics, National Yang Ming Chiao Tung University, [2]Institute of Lighting and Energy Photonics, College of Photonics, National Yang Ming Chiao Tung University, [3]Dept. of Photonics and Academy of Innovative Semiconductor and Sustainable Manufacturing, National Cheng Kung University
Solution processed direct electroluminescence QLED arrays with pixel dimension below 25 μm are demonstrated. When the injected current increased from 1 to 10 mA, the emission peak wavelength red-shift less than 10nm.

----- Coffee Break 10:30-10:40 -----

[LEDIA5] 10:40-11:40
Monolithic u-LED
Chair: Y. Saito
Toyoda Gosei

LEDIA5-01 10:40 ***Invited***

Combinational integration of Eu-doped GaN and InGaN LEDs and their prospects for miniaturization
Shuhei Ichikawa[1,2], Yasufumi Fujiwara[1], Kazunobu Kojima[1]
[1]Graduate School of Engineering, Osaka University, [2]Research Center for UHVEM, Osaka University
We demonstrate monolithically-stacked RGB LEDs consisting of GaN:Eu and InGaN QWs with remarkably wide color gamut. Furthermore, we show the evaluation of surface recombination processes and discuss prospects towards μ-LED applications.

Oral, Thursday, 25 April AM

LSC <Room 421>

LSC3-04 10:00

Development of time- and spin-resolved electron scattering (TSR-rEEELS, -RHEED)

Kaito Nishihara[1], Hiroshi Watanabe[1], Shin-ichi Kimura[1,2]
[1]Osaka University, [2]Institute for Molecular Science

Using machine learning, we're developing time- and spin-resolved electron scattering measurements (TSR-EELS and -RHEED) for observing dynamics of electronic and lattice structures. This will be used for investigations of electronics, plasmonics, and spintronics.

----- Coffee Break 10:15-10:35 -----

[LSC4] 10:35-11:45
Photoemission, absorption, scattering (2)
Chair: Hideaki Iwasawa
National Institutes for Quantum Science and Technology

LSC4-01 10:35 ***Invited***

Momentum microscopy with unique synchrotron radiation for spin and orbital characterization

Kenta Hagiwara[1], Xin Liang Tan[2], Ying-Jiun Chen[2], Christian Tusche[2], Claus Michael Schneider[2], Shigemasa Suga[2,3], Fumihiko Matsui[1]
[1]Institute for Molecular Science, [2]Forschungszentrum Jülich, [3]Osaka University

We investigated spin and orbital dependent band structure of quantum materials by state-of-the-art spin-resolved momentum microscopy combined with circularly polarized light and dual-beamline light sources.

LSC4-02 10:55 ***Invited***

Scanning Transmission X-ray Microscope System at SPring-8 BL23SU RI Laboratory

Goro Shibata, Yukiharu Takeda, Tohru Kobayashi, Tsuyoshi Yaita
Japan Atomic Energy Agency

We will introduce the scanning transmission X-ray microscope (STXM) system which was recently installed at the JAEA beamline BL23SU in SPring-8 and the scientific results so far obtained.

LSSE <Room 316>

LSSE8-03 10:17 ***Invited***

Space Integrated Computing Network: How Optical Laser Communication Technologies can drive more realtime space-data utilization

Tomohiro Ejiri
Space Compass Corporation

Space Compass Corporation, which NTT and SJC established in July 2022, will develop "the Space Integrated Computing Network" to make more real-time space data available by leveraging state-of-the-art space-based optical laser communication technologies.

----- Coffee Break 10:47-11:00 -----

OMC <Room 418>

OMC9-04 10:00

Real-time time-dependent density functional theory (RT-TDDFT) simulations of molecules interacting with orbital angular momentum (OAM) light

Takafumi Shiraogawa[1,2], Masahiro Ehara[1,2]
[1]Institute for Molecular Science, [2]The Graduate University for Advanced Studies

The real-time time-dependent density functional theory (RT-TDDFT) simulations of molecules interacting with orbital angular momentum (OAM) light are performed. We systematically investigate the influence of OAM on electronic structures and physical properties of molecules at atomic resolution in the time domain.

----- Coffee Break 10:15-10:45 -----

[OMC10] 10:45-12:00
Session 8
Chairs: Malcolm Kadodwala
University of Glasgow
Hiromi Okamoto
IMS

OMC10-01 10:45

Photovoltaic Measurement of Quantum Hall Electron Systems under Optical Vortex Irradiation

Kenichi Oto, Hajime Hasegawa, Takashige Omatsu
Chiba University

The interaction between electrons and optical vortices with orbital angular momentum is investigated using a quantum Hall electron system whose the energy and spin state are well-defined by Landau quantization and Zeeman splitting.

OWPT <Room 304>

OWPT5-02 10:00

PV Cell-Based Divider for Power-Over-Fiber Using Double-Clad Fibers

Yu Miyakawa[1], Yuya Yaguchi[1], Shih-Chun Lin[2], Suresh Subramaniam[3], Hiroshi Hasegawa[4], Motoharu Matsuura[1]
[1]University of Electro-Communications, [2]North Carolina State University, [3]George Washington University, [4]Nagoya University

We present a novel PV cell-based divider for power-over-fiber using double-clad fibers. The divider has a simple configuration and consists of a spatially divided system that utilizes the data signal transparency of a PV cell embedded in the divider. In this study, we evaluate the I-V and P-V characteristics of the PV cell and the transmission characteristics of data signal passed through the divider to show the feasibility of the system.

OWPT5-03 10:15

Backscattering-Based and Crosstalk-Based Monitoring Techniques for Power over Fiber Signals in Spatial Division Multiplexed Links

Rubén Altuna Pérez, Javier Barco Álvarez, Carmen Vázquez García
Universidad Carlos III de Madrid

We compare two monitoring techniques based on Backscattering and Crosstalk for Power over Fiber (PoF) signals. We test them in a 7-core 250m Multicore Fiber transmitting three Fifth Generation New Radio signals and a PoF.

----- Coffee Break 10:30-11:00 -----

Oral, Thursday, 25 April AM

SLPC <Room 416+417>

SLPC9-04 10:00

Experimental Characterization of Shock Wave Expansion in Innovative Nanosecond Laser Ablation Process Enabling Repair and Recycling

Dominic Heunoske, Martin Lueck, Jens Osterholz
Fraunhofer EMI

In the Rapid-KI project a new process is developed to control laser ablation for repairing or recycling electronic components that are protected by a coating. Therefore experimental data obtained from nanosecond single pulse experiemnts was used to calibrate a simulation model of laser ablation. The expansion of the shock wave was determined using a schlieren imaging system and the Sedov-Taylor theory.

----- Coffee Break 10:15-10:30 -----

[SLPCp] 10:30-12:00
SLPC Poster Session
<Exhibition Hall A>

Poster session program p.148-

TILA-LIC <Room 315>

----- Coffee Break 10:15-10:45 -----

[TILA-LIC6] 10:45-12:00
Laser Materials & Systems
Chair: Mariastefania De Vido
Science and Technology Facilities Council, Swindon, UK

TILA-LIC6-01 10:45 ***Invited***

Materials for Waveguide Lasers in the Visible

Xavier Mateos[1], Pavel Loiko[2], Mailyn Ceballos[1], Amandine Baillart[2], Gurvan Brasse[2], Rosa Maria Solé[1], Alain Braud[2], Weidong Chen[3], Magdalena Aguiló[1], Carolina Romero[4], Víctor Arroyo[4], Javier Rodriguez Vázquez de Aldana[4], Víctor Llamas[5], Josep Maria Serres[5], Patrice Camy[2], Francesc Díaz[1], Valentin Petrov[6]
[1]Universitat Rovira i Virgili, [2]Université de Caen Normandie, Caen, France, [3]Fujian Institute of Research on the Structure of Matter, Fuzhou, China, [4]University of Salamanca, Salamanca, Spain, [5]Eurecat, Centre Tecnològic de Catalunya, [6]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy

We overview the recent progress in rare-earth-doped fluoride and oxide materials for visible waveguide lasers. Liquid Phase Epitaxy growth and spectroscopy of Eu:KY(WO4)2 and Tb,Gd:LiYF4 epitaxial layers for planar waveguides are presented. Ultrafast Laser Inscription of depressed-cladding channel waveguides in Pr:LiYF4 and their laser operation in the orange are described.

XOPT <Room 313+314>

XOPT6-03 10:00 ***Invited***

High-throughput nanoscale ptychographic tomography achieved with rapid scanning microscopy instrument at HXN beamline

Zirui Gao, Weihe Xu, Wei Xu, Hanfei Yan, Dmitri Gavrilov, Huijuan Xu, Aaron Michelson, Yong Chu, Evgeny Nazaretski, Xiaojing Huang
Brookhaven National Laboratory

The RASMI-II instrument at NSLS-II enables high-throughput ptychographic tomography imaging. It utilizes rapid flyscanning and 3D position tracking to achieve sub-20 nm resolution in less than 1 hour, as demonstrated on microelectronics samples.

----- Coffee Break 10:30-10:55 -----

[XOPT7] 10:55-11:55
Imaging2
Chair: Jumpei Yamada
Osaka University

XOPT7-01 10:55

Multibeam ptychography: nanoimaging at macro scale

Mikhail Lyubomirskiy[1], Tang Li[1], Maik Kahnt[2], Ken Vidar Falch[1], Roman Zvagelsky[3], Thomas L Sheppard[3], Martin Wegener[3], Pablo Villanueva Perez[4]
[1]DESY, [2]MAX IV, [3]KIT, [4]Lund University

X-ray multibeam ptychography speeds up measurements of extended samples utilizing so far wasted photons. Until now, the major challenge was performing it with higher energies of the incident beam and with many beams (>3). This work shows the practical implementation of multibeam ptychography with 12 beams and up to 20 keV of irradiating beam energy.

Oral, Thursday, 25 April AM

ALPS <Room 303>

[ALPSp2]

Poster session program p.145-

----- Lunch 12:00-13:15 -----

ALPS <Room 511+512>

----- Lunch 12:00-13:30 -----

BFSS

[BFSSp]

Poster session program p.148

BISC <Room 419>

BISC6-02 11:15 *Invited*

Reflection phase microscopy for bioimaging

Youngwoon Choi[1,2], Yong Guk Kang[1], Kwanjun Park[1], Taeseok Daniel Yang[1]
[1]Department of Bioengineering, Korea University, [2]Interdisciplinary Program in Precision Public Health, Korea University

Our label-free 3D imaging technique, using wide-field reflection phase microscopy with narrow bandwidth light, ensures depth-selectivity through successive accumulation of interferograms. Validated for living cells, worms, and enhanced by a computational protocol, our method minimizes mechanical scans, advancing precision and speed in the imaging of biological samples.

BISC6-03 11:45

Refractive index measurement of myelinated co-cultured DRG neurons with surface plasmon microscopy

Ipsita Chakraborty[1], Akinari Abe[2], Yuki Miwahara[3], Kenta Shimba[3], Hiroshi Kano[2], Yasuhiko Jimbo[3], Andreas Offenhäusser[1]
[1]Forschungszentrum Jülich GmbH, [2]Muroran Institute of Technology, [3]University of Tokyo

In this work, we study the refractive-index profile of co-cultured myelinated dorsal root ganglion neurons from embryonic rats in-vitro with the developed surface plasmon microscope. This provides a platform to quantize the neuronal characteristics in a label-free manner.

BISC6-04 12:00

Generative Adversarial Network-Generated Refractive Structures for Light Propagation Simulations in Inhomogeneous Turbid Media

Jirawit Hamm Jiracheewee, Takahiro Nishimura
Osaka University

This study proposes a method using generative adversarial network to generate refractive structures then describes its refractive index inhomogeneities by persistent homology analysis and simulates light propagation on microscopic scale by the beam propagation method.

----- Lunch 12:15-13:30 -----

Oral, Thursday, 25 April AM

HEDS <Room 311+312>

HEDS8-03 11:05

The ALFA beamline: a new source of laser-driven high energy electrons at kHz repetition rate

Carlo Maria Lazzarini[1,2], Gabriele Maria Grittani[1], Petr Valenta[1], Illia Zymak[1], Roman Antipenkov[1], Uddhab Chaulagain[1], Leonardo Vila Nova Goncalves[1], Annika Grenfell[1], Marcel Lamac[1,3], Sebastian Lorenz[1,2], Michal Nevrkla[1,2], Alexandr Spacek[1,2], Vaclav Sobr[1], Wojciech Szuba[1], Pavel Bakule[1], Georg Korn[1], Sergei Vladimirovich Bulanov[1,4]
[1]ELI Beamlines Facility, The Extreme Light Infrastructure ERIC, Za Radnicí 835, 25241 Dolní Břežany, Czech Republic, [2]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Brehová 7, 11519 Prague, Czech Republic, [3]Faculty of Mathematics and Physics, Charles University, Ke Karlovu 3, 12116 Prague, Czech Republic, [4]Kansai Photon Science Institute, National Institutes for Quantum Science and Technology, 8-1-7 Umemidai, Kizugawa, Kyoto 619-0215, Japan

The new LWFA ALFA beamline will be introduced, based on the ELI Beamlines's in-house developed multi-cycle (15 fs) 1 kHz OPCPA power-scalable laser system. Recent results show the acceleration of collimated (few mrad divergence), quasi-monoenergetic electron beams with record breaking peak energy in the tens of MeV at 1 kHz repetition rate. These last could enable innovative medical applications.

HEDS8-04 11:20

Density dependence of positron acceleration by longitudinal electric field in relativistic laser-plasma interaction

Kaoru Sugimoto
Yuakawa Institute for Theoretical Physics, Kyoto University

We performed 2D PIC simulation of interaction between an ultra-intense laser light and a near critical density plasma. It has been observed that e^--e^+ pair creation happened due to photon collisions. Some of the positrons are accelerated by a longitudinal electric field induced by a charge separation at the laser pulse front. The positrons are energized to near GeV level. We also confirmed that positron acceleration can be caused by initial target density 0.5-5.6n_c.

HEDS8-05 11:35

Anisotropic backscattering induced by focused single ultra-high intensity laser beam in quantum vacuum

Takumi Hara[1], Ryosuke Kodama[1,2]
[1]Graduate School of Engineering, Osaka University, [2]Institute of Laser Engineering, Osaka University

We will present the analysis results of anisotropic backscattering via four-wave mixing process induced by focusing a single ultra-intense laser beam at a large angular aperture in the quantum vacuum.

----- Lunch 11:50-13:15 -----

IP <Room 414+415>

[IP6] 11:00-12:00
Computational Imaging 2
Chair: Koichi Nitta
Kobe University

IP6-01 11:00 ***Invited***

Exploring the Potential of Light Detection and Ranging for Society 5.0

Chao Zhang[1,2], Atsushi Nakamura[3]
[1]Shimane University, [2]The University of Tokyo, [3]NTT Corporation

Infrastructure inspections using LiDAR has attracted attentions recently. We present FMCW and ToF LiDAR to achieve long and high-precision ranging, which are expected to be introduced in infrastructure inspection to enhance the inspection frequency.

IP6-02 11:30

Simulation of a compressive sensing-based two-frequency time of flight Lidar system

Tuan Duc Pham[3], Yoshio Hayasaki[2], Quang Duc Pham[1]
[1]University of Engineering and Technology, Vietnam National University Hanoi, [2]Center for Optical Research and Education (CORE), Utsunomiya University, [3]School of mechanical engineering, Hanoi university of science and technology

A light detection and ranging (Lidar) system based on time of flight (ToF) measurement technique and compressive sensing technique was introduced. Employing the two-frequency method the Lidar system can be extended the measurement range while maintaining the accuracy of an existing system that utilizes a single-frequency carrier.

IP6-03 11:45

Assessing U-Net and Attention-UW Net in the Segmentation of Brain Tumor Images from Magnetic Resonance Imaging

Clara Lavita Angelina[1,2], Sunil Vyas[3], Hsuan Ting Chang[1,2], Yuan Luo[3,4,5], Fu Ren Xiao[3]
[1]Department of Electrical Engineering, National Yunlin University of Science and Technology, [2]Graduate School of Engineering Science and Technology, National Yunlin University of Science and Technology, [3]Institution of Medical Device and Imaging, National Taiwan University, [4]YougLin Institute of Health, National Taiwan University, [5]Program for Precision Health and Intelligent Medicine, National Taiwan University

Image segmentation in MRI is essential for diagnosis. Our study applied Attention-UW Net for brain lesion segmentation in MRI, showing its superiority over U-Net. Attention-UW Net achieved better performance (IoU: 0.80 vs. 0.75, precision: 0.86 vs. 0.85, recall: 0.83 vs. 0.70, F1 score: 0.80 vs. 0.81).

----- Lunch 12:00-13:30 -----

LDC <Room 301>

[LDC9] 11:00-11:30
Imaging / Lighting 1
Chair: Eiji Hase
Tokushima University

LDC9-01 11:00 ***Invited***

Quantum photon sourse for laser sensing and imaging

Sunao Kurimura[1], Ryo Okamoto[2], Shigeki Takeuchi[2]
[1]NIMS, [2]Kyoto University

Quantum photon source is demonstrated by specially designed quasi-phase matching device. Fabrication technologies such as electron-beam lithography and super-resolution patterning were applied. Broad spectrum from chirped periodic structure improved depth resolution in twophoton-interference sensing.

[LDC10] 11:30-11:36
Poster Short Presentation
Chair: Eiji Hase
Tokushima University

Please see the session of LDCp (p.152).

LDC10-01 11:30

Grating-based AR display system with three-layer volume holographic lightguide

LDC10-02 11:33

Investigation of human skin mechanics by using multimodal SHG, TPEF, and Brillouin scattering microscopy

----- Lunch 11:36-13:30 -----

LEDIA <Room 211+212>

LEDIA5-02 11:10 ***Invited***

Demonstration of stacked InGaN full color monolithic micro LED display

Koichi Goshonoo, Koji Okuno, Masaki Ohya
Toyoda Gosei

By applying a technology of monolithic LED structure with RGB area within a single device, a full-color monolithic micro-LED display was fabricated and demonstrated.

----- Lunch 11:40-13:15 -----

Oral, Thursday, 25 April AM

LSC <Room 421>

LSC4-03 11:15

Ultrafast dynamics on λ-Ti_3O_5 thin films excited by ultrashort pulse laser

R. Takahashi[1], S. Nakata[1], K. Yoshimatsu[2], H. Kumigashira[2], H. Wadati[1,3]
[1]Department of Materials Science, Graduate School of Science, University of Hyogo, [2]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, [3]Institute of Laser Engineering, Osaka University

In my talk, I will discuss the dynamical response of optical properties in λ-Ti_3O_5 to ultrashort laser pulse excitation, in conjunction with static optical properties.

LSC4-04 11:30

Two-wavelength excitation near-infrared imaging with upconversion in Er3+

Yugo Akabe
Osaka University

In recent years, demand for imaging cameras in the near-infrared region has increased with the spread of self-driving cars and drones. On the other hand, existing near-infrared imaging cameras are complicated and expensive. In this study, we developed a simpler near-infrared imaging system using up-conversion in Er3+.

----- Lunch 11:45-13:15 -----

LSSE <Room 316>

[LSSE9] 11:00-12:00
Remote Sensing
Chair: Takashi Fujii
The University of Tokyo

LSSE9-01 11:00 ***Invited***

A study of the upper Mesosphere and lower Thermosphere with EISCAT_3D radar and sodium LIDAR

Satonori Nozawa[1], Norihito Saito[2], Yasunobu Ogawa[3], Takuya D. Kawahara[4], Taishi Hashimoto[3], Takuo T. Tsuda[5], Hiroshi Miyaoka[3], Tetsuya Kawabata[1], Magnar G. Johnsen[6], Axel Steuwer[7]
[1]Institute for Space-Earth Environmental Research, Nagoya University, [2]RIKEN Center for Advanced Photonics, RIKEN, [3]National Institute of Polar Research, [4]Shinshu University, [5]The University of Electro-Communications, [6]Tromsø Geophysical Observatory, UiT The Arctic University of Norway, [7]EISCAT Scientific Association

We will present the current status of EISCAT_3D radar and a sodium LIDAR at Tromsoe, and future plans. The EISCAT_3D is a new powerful IS radar for the ionosphere (70-1000 km). The sodium lidar at Tromsoe will also play an additional important role by providing neutral temperature and wind velocities between 80 and 110 km.

LSSE9-02 11:30 ***Invited***

Remote sensing of the Earth's atmosphere utilizing limb-sounding by the Japanese geostationary satellites

Takuo T. Tsuda
University of Electro-Communications

In this talk, we will introduce the limb-sounding of the Earth's atmosphere by the Japanese Geostationary satellites, Himawari-8/9, which provide new applications such as polar mesospheric cloud observations and temperature retrievals with near-global coverage.

----- Lunch 12:00-13:20 -----

OMC <Room 418>

OMC10-02 11:00

Plasmonic nanogap optical vortex excitation via spin-to-orbital angular momentum conversion

Christophe Pin, Keiji Sasaki
Hokkaido University, RIES

In this study, we design a hexamer nanoantenna composed of gold nanorods with a periodic tilt and numerically analyze the excitation efficiency of the nanogap quadrupole mode under circularly polarized plane wave irradiation.

OMC10-03 11:15

Comparison of laser-processed terahertz metalenses with numerical simulation of measured focusing characteristics

Yuki Hakamada, Mizuho Matoba, Haruyuki Sakurai, Kuniaki Konishi
The University of Tokyo

In this presentation, we report the numerical simulation of focusing characteristics of terahertz metalenses fabricated by femtosecond laser processing and compare it with the experimental results. We find that they are in good agreement.

OMC10-04 11:30

Room Temperature Exciton Polariton Interactions in Van der Waals Superlattices

Jiaxin ZHAO
Nanyang Technological University

Monolayer group-VI transition-metal dichalcogenides (TMDs), a new class of two-dimensional semiconductors, have attracted significant research interest due to their sizable direct bandgap and exceptional optical and electronic properties. In this work, we successfully demonstrate the realization of nonlinear optical parametric polaritons in a WS_2 monolayer microcavity [1].

OMC10-05 11:45

Wide-area light-induced selective detection of nano-biomaterials with nano-bowl plasmonic substrate

Masatoshi Kanoda[1,2,3], Kota Hayashi[1,2,3], Yumiko Takagi[2,1], Shuich Toyouchi[1,2], Mamoru Tamura[2,4], Shiho Tokonami[2,3], Takuya Iida[1,2]
[1]Graduate School of Science, Osaka Matropolitan University, [2]Research Institute for Light-induced Acceleration System (RILACS), [3]Graduate School of Engineering, Osaka Metropolitan University, [4]Graduate School of Engineering Science, Osaka University

Optical condensation enables rapid and dense assembling and detecting small objects by laser-induced convection. A nano-bowl substrate was developed for highly-efficient optical condensation with a low-power laser with mW-level. In this work, we investigate the operation area optical condensation with a nano-bowl substrate by adjusting the laser power to enhance the difference in assembling dispersion with and without microbubbles.

----- Lunch 12:00-13:30 -----

OWPT <Room 304>

[OWPT6] 11:00-12:00
Session 6
Chair: Motoharu Matsuura
Univ. Electro-Communications

OWPT6-01 11:00 ***Invited***

Optical Wireless Power Transmission for Moving Object using Image Recognition

Takeo Maruyama
Kanazawa University

We focus on the construction of an automatic beam-tracking system for optical wireless power transmission to moving objects. The system is based on a combination of position recognition using a CMOS camera and high-speed beam steering using a Galvano mirror. The system was successfully used in the optical wireless power transmission for a miniature car.

OWPT6-02 11:30

Integrative Dynamic Safety System for OWPT: Real-Time Velocity and Distance-Based Safety Control

CHEN ZUO, Tomoyuki Miyamoto
Tokyo Institute of Technology

An enhanced Optical Wireless Power Transmission (OWPT) safety framework has been developed that includes both fixed and dynamic velocity-responsive safety distances. This hybrid model dynamically adjusts the safety distance based on object velocity and system latency, addressing the shortcomings of previous methods. Experiments with objects crossing the OWPT field at variable velocities demonstrated the robustness of the system for over 300 trials.

OWPT6-03 11:45

LED Based Automatous Optical Wireless Power Transmission for Large Size Beam 2D Aiming

Mingzhi Zhao, Tomoyuki Miyamoto
Tokyo Institute of Technology

In this research, an LED-based OWPT system is proposed with autonomous tracking and beam aiming, which is especially designed fo large size beam spot systems. The integration of deep learning, dual-axis mirror control, and optical system design achieves this auto-OWPT system as a significant improvement. In addition, the power transmission performance is evaluated and analyzed in the simulation and experiment.

----- Lunch 12:00-13:30 -----

Oral, Thursday, 25 April AM

SLPC <Room 416+417>

[SLPCp]

Poster session program p.148-

----- Lunch 12:00-13:15 -----

TILA-LIC <Room 315>

TILA-LIC6-02 11:15

Room temperature direct bonding of Yb,Er:phosphate glass and Co:spinel crystal

Jianbin Zhao, Xinchang Wu, Yitong Chen, Min Wu, Jinhong Wang, Jiawei Li, Lihe Zheng
Yunnan University

The heterogeneous direct bonding between Yb,Er:phosphate glass and Co:spinel crystal was achieved by surface activated bonding method. By using diamond-wire with thickness of 0.35 mm, the monolithic bonded-sample for eye-safe laser application was orthogonally sliced into four pieces without interfacial debonding.

TILA-LIC6-03 11:30 *Invited*

Development of high-power ultrafast laser sources at 2.1 µm wavelength

Anna Suzuki, Sergei Tomilov, Weichao Yao, Yicheng Wang, Martin Hoffmann, Clara Jody Saraceno
Ruhr University Bochum, Germany

We present our achievements in the development of high-power ultrafast laser sources in the 2.1-µm wavelength range. We explored the potential of Ho-based lasers toward high-energy, high-average power, and broadband laser emission in different geometries.

----- Lunch 12:00-13:30 -----

XOPT <Room 313+314>

XOPT7-02 11:10

Real-life challenges of single-beam ptychography vs. multi-beam ptychography

Tang Li[1], Maik Kahnt[2], Thomas L. Sheppard[3,6], Qunqing Yang[4], Ken Vidar Falch[1], Roman Zvagelsky[5], Pablo Villanueva-Perez[4], Martin Wegener[5], Mikhail Lyubomirskiy[1]
[1]Centre for X-ray and Nano Science CXNS, DESY, [2]MAX IV Laboratory, Lund university, [3]Institute for Chemical Technology and Polymer Chemistry, Karlsruhe Institute of Technology, [4]Division of Synchrotron Radiation Research and NanoLund, Department of Physics, Lund Uni, [5]Institute for Applied Physics, Karlsruhe Institute of Technology, [6]Institute of Chemical Technology, Leipzig University

Multi-beam ptychography (MBP) enables X-ray ptychography on larger samples without sacrificing resolution. This paper discusses MBP's challenges, including speed trade-offs, reconstruction quality compared to single-beam ptychography, the effects of detector dynamic range on probe numbers, and the impacts of vibrations and coherence. We base our findings on recent MBP experiments to identify key performance factors.

XOPT7-03 11:25

Development of Single-Frame Spectro-microscopy Using Non-monochromatized Soft X-ray Beam

Kyota Yoshinaga[1], Yoko Takeo[1,2,3], Takenori Shimamura[1,2,3], Satoru Egawa[1], Kai Sakurai[1,2], Jordan Tyler O'Neal[1], Yu Nakata[1], Hikaru Kishimoto[2], Yasunori Senba[2,3], Haruhiko Ohashi[2,3], Takashi Kimura[1,3]
[1]The University of Tokyo, [2]JASRI, [3]RIKEN

We constructed the single-frame spectro-microscopic system at the soft X-ray beamline BL07LSU of SPring-8. Using the system, we successfully measured a hyperspectral image of a test sample with a single frame exposure.

XOPT7-04 11:40

Single-shot high-resolution in-line holography with XFEL

Gota Yamaguchi[1], Jumpei Yamada[2], Atsuki Ito[2], Kota Shioi[2], Taito Osaka[1], Ichiro Inoue[1], Yuichi Inubushi[1,3], Takashi Kameshima[1,3], Kazuto Yamauchi[2], Makina Yabashi[1,3]
[1]RIKEN SPring-8 Center, [2]Osaka University, [3]JASRI

We are developing single-shot full-field phase-contrast imaging by combining the XFEL sub-10nm focusing system with in-line holography. The reconstructed image of Ag nanocubes indicated a spatial resolution of 10-20 nm. In this presentation, we report the status of our development and the results of preliminary experiments.

----- Lunch 11:55-13:30 -----

Oral, Thursday, 25 April PM

ALPS <Room 303>

[ALPS21] 13:15-14:45
Optical frequency combs / Frequency stabilized lasers and applications (4)
Chair: Akifumi Asahara
University of Electro-Communications

ALPS21-01 13:15 ***Invited***

It's the perfect *timing* for optical frequency combs
Jungwon Kim
KAIST
I will present on the latest progress in the ultralow-noise frequency combs and their applications with an emphasis on precision timing, synchronization, and microwave/mm-wave photonics.

ALPS21-02 13:45

Broadband Beam Steering by Optical Frequency Comb-Based Optical Phased Array
Takashi Kato[1,2], Kaoru Minoshima[1]
[1]The University of Electro-Communications, [2]PRESTO, JST
The proposed method employs a broadband optical phased array with a phase-controlled optical frequency comb for scanning optical dots. Precise control of the comb's frequency parameters eliminates the need for optical setup calibration.

ALPS21-03 14:00

Improvement of Suppression Ratio in Broadband Background Noise Canceling Method using Phase-controlled Optical Frequency Comb
Keito Hino, Takashi Kato, Yasuhisa Nekoshima, Kaoru Minoshima
The University of Electro-Communications
We used a phase-controlled optical frequency comb to remove broadband pulses in the optical domain. This method achieved a suppression ratio of 26.3 dB by tailoring the difference in dispersion in the optical setup.

ALPS <Room 511+512>

[ALPS25] 13:30-15:00
Quantum optics and their applications (2)
Chair: Rikizo Ikuta
Osaka Univ.

ALPS25-01 13:30 ***Invited***

Rydberg atom-based sensors for radio-frequency electric field measurement
Bao-Sen Shi, Dong-Sheng Ding, Zong-Kai Liu, Li-Hua Zhang, Bang Liu
University of Science and Technology of China
In this talk, I will mainly report the new results of Rydberg atomic-based radio-frequency electric field sensing achieved in our group.

ALPS25-02 14:00

Twin-field-like-continuous-variable quantum key distribution with highly non-Gaussian state
Makoto Ishihara, Wojciech Roga, Masahiro Takeoka
Keio University
We propose a continuous-variable quantum key distribution protocol of which a key rate overcomes the repeaterless bound. We calculate its key rate by numerical optimization with new constraints which can estimate our highly non-Gaussian state.

BISC <Room 419>

[BISCp] 13:30-15:00
BISC Poster Session
<Exhibition Hall A>

Poster session program p.149-

HEDS <Room 311+312>

[HEDS9] 13:15-15:15
Collisionless Shock & Accretion Disk
Chair: Ryo Yamazaki
Aoyama Gakuin University

HEDS9-01 13:15 ***Invited***

Cosmic-Ray Activities in the Coronae of Active Supermassive Black Holes
Yoshiyuki Inoue
Osaka University
Active supermassive black holes host X-ray bright, hot plasma, known as coronae. In this talk, I will discuss our current understanding of non-thermal coronal activities from both theoretical and observational points of view.

HEDS9-02 13:40 ***Invited***

Electron acceleration at oblique supernova remnant shocks
Artem Bohdan
Max Planck Institute for Plasma Physics
SNRs are known as efficient particle accelerators due strong non-thermal radiation emitted by self-produced relativistic electrons, protons and ions. We use particle-in-cell simulations to study microphysics of electron acceleration in oblique high Mach number shocks. In this case, fast electrons can escape to the shock upstream, modifying the shock foot to a region called the electron foreshock and strongly affecting electron acceleration efficiency.

HEDS9-03 14:05 ***Invited***

Magnetorotational Instability in electron-ion plasma: Shearing-box simulations
Evgeny A Gorbunov[1], Fabio Bacchini[1,2]
[1]KU Leuven, [2]Royal Belgian Institute for Space Aeronomy, Solar-Terrestrial Centre of Excellence
With a novel shearing-box method, we study collisionless MRI turbulence in electron-ion plasmas in accretion disks. Our goal is to construct a first-principles electron-ion heating ratio prescription for accurate modeling of accretion flows.

Oral, Thursday, 25 April PM

IP <Room 414+415>

[IPp] 13:30-15:00
IP Poster Session
<Exhibition Hall A>

Poster session program p.151-

LDC <Room 301>

[LDCp] 13:30-15:00
LDC Poster Session
<Exhibition Hall A>

Poster session program p.152

LEDIA <Room 211+212>

[LEDIA6] 13:15-14:45
Growth
Chair: Y. Honda
Nagoya University

LEDIA6-01 13:15

Epitaxial Growth of Transition Metal Nitrides on Nitride Semiconductors

Atsushi Kobayashi[1], Takuya Maeda[2], Yoshio Honda[3]
[1]Tokyo University of Science, [2]The University of Tokyo, [3]Nagoya University

We investigate the crystal structure variations and fundamental electrical and optical properties of NbN and ScAlN epitaxially grown on nitride semiconductors.

LEDIA6-02 13:30

Fabrication of high-quality Al-polar and N-polar AlN templates through self-forming tiny-pits layer

Narihito Okada[1], Aina Hiyama Zazuli[1], Daisuke Inahara[1], Taketo Kowaki[1], Minagi Miyamoto[1], Kai Fujii[1], Ryosuke Ninoki[1], Sora Nagata[1], Taisei Kimoto[1], Satoshi Kurai[1], Yoshihiro Sugawara[2], Daisaku Yokoe[2], Yongzhao Yao[2], Yukari Ishikawa[2], Yoichi Yamada[1]
[1]Yamaguchi University, [2]Japan Fine Ceramics Center

A fabrication technique for high-quality AlN templates with a tiny-pit AlN layer is proposed. The dislocation density and radius of curvature of the AlN layer were improved. The N-polar AlN layer was grown using Al-polar tiny-pit AlN layers through polarity inversion. As a result, the Al-polar tiny-pit AlN was very effective in improving the crystalline quality of the N-polar AlN layer.

LEDIA6-03 13:45

Metal catalyst effect on β-Ga_2O_3 growth using trihalide vapor phase growth

Kosuke Taguchi[1], Kentaro Ema[2], Kohei Sasaki[2], Hisashi Murakami[1]
[1]Tokyo University of Agriculture and Technology, [2]Novel Crystal Technology, Inc

The effect of adding metallic indium (In) impurities during Ga_2O_3 homoepitaxial growth by THVPE method on the growth rate and crystallinity was investigated. Under the condition without In addition, the growth rate was about 2 μm/h. However, the growth rate increased with increasing In addition, and a growth rate of over 8 μm/h was obtained when the mass ratio of In to Ga of 0.10.

LEDIA6-04 14:00

Origin of reverse leakage current in vertical pn junction diode on OVPE-GaN substrate

S. Usami[1], J. Takino[2], M. Imanishi[1], T. Sumi[2], H. Watanabe[3], S. Nitta[3], Y. Honda[3], Y. Okayama[2], H. Amano[3], Y. Mori[1]
[1]Grad. School of Eng., Osaka University, [2]Panasonic Holdings Corporation, [3]IMass, Nagoya University

We investigated the cause of reverse leakage current in a vertical pn junction diode on an OVPE-GaN substrate. The results revealed that the leakage current was caused by some threading dislocations propagated form the OVPE-GaN substrate.

LSC <Room 421>

[LSC5] 13:15-15:05
Photoemission, absorption, scattering (3)
Chair: Goro Shibata
Japan Atomic Energy Agency

LSC5-01 13:15 ***Invited***

Visualization of optical polarization transfer to photoelectron spin vector emitted from a spin-orbit coupled surface state

Kenta Kuroda[1,2]
[1]Hiroshima University, [2]WPI-SKCM2

Like light polarization that is selected by a superposition of the optical basis, the electron spin direction can be controlled through a superposition of the spin basis. By spin- and angle-resolved photoemission spectroscopy with a laser, we demonstrate that such optical information can be projected to the 3D spin vector of the photoelectrons from Bi_2Se_3 surface, permitting us to optically control the pure spin state pointing to an arbitrary direction.

LSC5-02 13:35 ***Invited***

O *K*-edge RIXS study of Os Electronic Structures in $5d^2$ Double Perovskite Ba_2CaOsO_6

Jun Okamoto[1], Goro Shibata[2], Hiroaki Hayashi[3,4], Hsiao-Yu Huang[1], Amol Singh[1], Arata Tanaka[5], Kazunari Yamaura[3,4], Yu S. Posonov[6], Sergey V. Streltsov[6,7], Chien-Te Chen[1], Atsushi Fujimori[1,8,9], Di-Jing Huang[1,10,11]
[1]National Synchrotron Radiation Research Center, Taiwan, [2]Materials Science Research Center, Japan Atomic Energy Agency, [3]Research Center for Materials Nanoarchitectonics, National Institute for Materials Science, [4]Graduate School of Chemical Science and Engineering, Hokkaido University, [5]Department of Quantum Matter, Hiroshima University, [6]Institute of Metal Physics, Russia, [7]Department of Theoretical Physics and Applied Mathematics, Ural Federal University, [8]Department of Physics and Center for Quantum Technology, National Tsing Hua University, [9]Department of Physics, The University of Tokyo, [10]Department of Physics, National Tsing Hua University, [11]Department of Physics, National Yang Ming Chao Tung University

We investigated the Os *5d* electronic structures of $5d^2$ double-perovskite Ba_2CaOsO_6 that are proposed to exhibit magnetic octupole order using the O *K*-edge resonant inelastic X-ray scattering through the strong hybridization between the O *2p* and Os *5d* orbitals.

LSC5-03 13:55 ***Invited***

Terahertz components fabricated by femtosecond laser processing

Xi Yu[1], Dejun Liu[2], Verdad Canila Agulto[3], Kensuke Miyajima[1], Makoto Nakajima[3], Fumihiro Itoigawa[4], Shingo Ono[4]
[1]Tokyo University of Science, [2]Shanghai Normal University, [3]Osaka University, [4]Nagoya Institute of Technology

Femtosecond (fs) laser processing is being widely utilized for the research of micro and nano machining. Using fs laser processing, we realized a quarter-wavelength plate for Terahertz(THz) waves on a Zinc Oxide substrate. High-*Q* factor and polarization-independent quasi-bound states in the continuum were also achieved in the THz all-metal devices by this method. These fs laser-fabricated THz components were evaluated by both experiments and simulations.

Oral, Thursday, 25 April PM

LSSE <Room 316>

[LSSE10] 13:20-15:00
Space Technology 3
Chair: Tadanori Fukushima
Orbital Lasers

LSSE10-01 13:20 ***Invited***

Cost and Benefit Analysis of Orbital Debris Remediation

Thomas J Colvin, Jericho W Locke
NASA Office of Technology, Policy, and Strategy

This report presents a cost-benefit analysis of various approaches to debris remediation, which refers to any action taken to reduce the risks posed by orbital debris by moving, removing, or reusing it. A thorough understanding of the near-term costs and benefits of different remediation approaches can inform decision-making regarding R&D investment and policy creation in this field.

LSSE10-02 13:50 ***Invited***

Space Propulsion by Laser / Light Ablation for Space Debris Cleaning

Koichi Mori
Osaka Metropolitan University

New designs of the space propulsion by laser or light ablation for Space Debris Cleaning has been pursued experimentally. We are now measuring the ablative propulsion force with extremely weak power density using an electrostatic levitation furnace, which is useful to simulate the thermally and mechanically isolated state of the real space debris in space. Moreover, we recently try to measure the impulsive force due to the ablation by extremely-ultraviolet light.

LSSE10-03 14:20

Micro-integrated diode laser module for a spaceborne optical frequency reference – design and mechanical evaluation

Dian Zou, Martin Gärtner, Nora Goossen-Schmidt, Stephanie Gerken, Janpeter Hirsch, Simon Kubitza, Norbert Müller, Max Schiemangk, Christoph Tyborski, Andreas Wicht
Ferdinand-Braun-Institut (FBH), Leibniz-Institut fuer Hoechstfrequenztechnik

We present the design of a miniaturized laser module for a spaceborne optical clock. Furthermore, results of its mechanical evaluation are shown, demonstrating the module's ability to withstand the mechanical loads of the rocket launch.

OMC <Room 418>

[OMCp] 13:30-15:00
OMC Poster Session
<Exhibition Hall A>

Poster session program p.152-

OWPT <Room 304>

[OWPT7] 13:30-15:00
Session 7
Chair: Gen-ichi Hatakoshi
Waseda Univ.

OWPT7-01 13:30 ***Invited***

C-band Multi-Junction Photonic Power Converters: AI Techniques for Optimized Designs and Role of Luminescent Coupling

Karin Hinzer[1], Robert F. H. Hunter[1], D. Paige Wilson[1], Gavin P. Forcade[1], Meghan N. Beattie[1], Christopher E. Valdivia[1], Oliver Höhn[2], Louis-Philippe St-Arnaud[1], David Lackner[2], Yuri Grinberg[4], Mathieu de Lafontaine[1], Carmine Pellegrino[2], Jacob J. Krich[1], Alexandre W. Walker[3], Henning Helmers[2]
[1]University of Ottawa, [2]Fraunhofer Institute for Solar Energy Systems ISE, [3]Advanced Electronics and Photonics Research Centre, National Research Council of Canada, [4]Digital Technologies Research Centre, National Research Council of Canada

Photovoltaic devices containing InGaAs absorbers, lattice matched to InP, have shown excellent performance in many applications. We have developed a machine learning empowered computational framework to explore design space for optoelectronic devices. We present results on 1-junction to 10-junction devices. Luminescent coupling effects increase when devices have a back reflector.

OWPT7-02 14:00

High Efficiency (> 40%) InGaAsP Photovoltaic Device for 1.06-μm-range Laser Power Transmission

Yuga Motomura[1], Takaya Oshimo[1], Masahiro Koga[2], Kosuke Watanebe[2], Shiro Uchida[2], Kouichi Akahane[3], Yukiko Suzuki[4], Natsuha Ochiai[4], Kazuto Kashiwakura[4], Youhei Toriumi[4], Kensuke Nishioka[1], Masakazu Arai[1]
[1]University of Miyazaki, [2]Chiba Institute of Technology, [3]National Institute of Information and Communications Technology, [4]NTT Space Environment and Energy Laboratories

We fabricated InGaAsP photovoltaic devices for 1.064-nm optical wireless power transmission grown by metalorganic vaper phase epitaxy. We investigated the effect of antireflection coating, the difference of electrode shape and incident laser power dependence of current-voltage characteristics, experimentally. The power maximum power conversion efficiency exceeded 40%.

OWPT7-03 14:15

Photoelectric conversion characteristics of CIGS solar cells under 1064nm laser light irradiation

Moeka Chiba[1], Shunsuke Shibui[1], Shuntaro Fujii[1], Hironori Komaki[2], Hiroaki Nakamura[2], Hiroshi Tomita[2], Takato Ishiuchi[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Idemitsu Kosan

The temperature characteristics of CIGS solar cells under 1064nm laser irradiation were investigated. As a result, it was found that high photoelectric conversion efficiency was maintained even at a high temperature of 60 deg-C.

SLPC <Room 416+417>

[SLPC10] 13:15-14:30
Welding 1
Chairs: Yuji Sato
Osaka University
Jörg Volpp
Luleå University of Technology

SLPC10-01 13:15 ***Invited***

Spatter reduction by laser welding with multi-spot optics

Alexander Laskin[1], Joerg Volpp[2], Takuji Nara[3]
[1]AdlOptica Optical Systems GmbH, [2]Lulea University of Technology, [3]Profitet

Spatter and porosity by laser welding of Cu and Al parts are reduced through splitting laser beam energy in 2x2 or 3x3 spot patterns using multi-spot optics providing optimal temperature profiles in melt pool.

SLPC10-02 13:45

The influence of the capillary shape on process emissions

Michael Haas[1,2], Felix Zaiß[1], Johannes Wahl[1], Marc Hummel[3], Alexander Olowinsky[3], Felix Beckmann[4], Julian Moosmann[4], Christian Hagenlocher[1], Andreas Michalowski[1]
[1]Institut für Strahlwerkzeuge (IFSW), University of Stuttgart, Pfaffenwaldring 43, 70569 Stuttgart, Germany, [2]Graduate School of Excellence advanced Manufacturing Engineering, University of Stuttgart, Nobelstr. 12, 70569 Stuttgart, Germany, [3]Fraunhofer Institute for Laser Technology ILT, Steinbachstr. 15, 52074 Aachen, Germany, [4]Institute of Materials Physics, Helmholtz-Zentrum Hereon, Max-Planck-Str. 1, 21502 Geesthacht, Germany

Partial-penetration laser welding is investigated using X-ray imaging to analyze the influence of the geometry of the vapor capillary on measured process emissions. The results are a basis to improve process monitoring during welding.

SLPC10-03 14:00

Elucidation of Sp a tter Generation Mechanism in Medium Vacuum Laser Welding

Kai Tomita[1], Koichi Taniguchi[1], Keiji Ueda[1], Yuji Sato[2], Masahiro Tsukamoto[2]
[1]JFE Steel Corporation, [2]JWRI, Osaka Univ.

Laser welding under an atmospheric pressure of 1200 Pa or more clarified that the molten pool repeatedly expanded and shrunk due to unstable heat input, leading to the generation of spatter.

SLPC10-04 14:15

Application of MDL/E System in Tailored Laser Welding of Automobile Door Ring

Qin Qin Tao, Zhixiang Chen
SERVO-ROBOT (Shanghai) Trading Co., Ltd.

Considering new challenges in body-in-white design, one-piece hot stamping door ring technology is being applied by more and more car manufacturers. As a key part of this, tailored laser welding technology has a direct effect on the final strength of the door ring and body safety. Servo-Robot's modular laser welding tracking and quality control and monitoring system provides a reliable vision solution.

Oral, Thursday, 25 April PM

TILA-LIC <Room 315> | XOPT <Room 313+314>

[TILA-LICp] 13:30-15:00
POSTER Session & ATLA Project - 2
<Exhibition Hall A>

Poster session program p.153-

[XOPT8] 13:30-14:15
XFEL2
Chair: Hiroto Motoyama
The University of Tokyo

XOPT8-01 13:30 ***Invited***

MHz X-ray Multi-Projection Imaging

Patrik Vagovic[1], Pablo Villanueva Perez[2], Valerio Bellucci[3], Wataru Yashiro[4], Andrea Mazollari[5], Tokushi Sato[3], Jaynath Koliyadu[3], Sarlota Birnsteinova[3], Eleni Myrto Asimakopoulou[2], Chan Kim[3], Romain Letrun[3], Richard Bean[3], Andrea Mazzolari[5], Jozef Ulicny[6], Alke Meents[1], Adrian P. Mancuso[7], Daniel Eakins[8], Alexander Korsunsky[8], Hitoshi Soyama[9]
[1]*Center for Free-Electron Laser (CFEL), DESY, Notkestraße 85, 22607 Hamburg,* [2]*Synchrotron Radiation Research and NanoLund, Lund University, Box 118, Lund, 221 00, Sweden,* [3]*European XFEL GmbH, Holzkoppel 4, 22869 Schenefeld,* [4]*International Center for Synchrotron Radiation Innovation Smart (SRIS), Tohoku University, Katahira 2-1-1, Aoba-ku, Sendai, Miyagi 980-8577, Japan,* [5]*Ferrara University, Department of Physics and Earth Science, Via Saragat 1, 44122 Ferrara, Italy,* [6]*Faculty of Science, Department of Biophysics, P. J. Šafárik University, Jesenná 5, 04154 Košice, Slovakia,* [7]*Diamond Light Source, Harwell Science and Innovation 28 Campus, OX11 0DE, United Kingdom,* [8]*Department of Engineering Science, University of Oxford, Parks Road, Oxford OX1 3PJ, UK,* [9]*Department of Finemechanics, Tohoku University, 6-6-01 Aramaki, Aoba-ku, Sendai 980-8579, Japan*

We demonstrate megahertz X-ray multi-projection X-ray imagingbased on a novel X-ray splitting scheme compatible with SASE sources. This scheme generates multiple beamlets from the primary beam and orchestrates their rotation around the sample. Each synchronized projection is captured and imaged using fast MHz indirect detectors. We validated this setup by imaging the coalescence process of water droplets.

XOPT8-02 14:00

The Soft X-ray Monochromator at the SASE3 beamline of the European XFEL

Natalia Gerasimova, Daniele La Civita, Liubov Samoylova, Maurizio Vannoni, Raul Villanueva, David Hickin, Robert Carley, Benjamin van Kuiken, Loic Le Guyader, Laurent Mercadier, Giuseppe Mercurio, Justine Schlappa, Martin Teichmann, Harald Sinn, Andreas Scherz
European XFEL

We report on design, implementation and successful operation of the soft X-ray grating monochromator at the SASE3 beamline of the European XFEL. The FEL-specific challenges and prospects towards optimal design performance are discussed.

XOPT8-03 ***Withdraw***

----- Coffee Break 14:15-14:55 -----

Oral, Thursday, 25 April PM

ALPS <Room 303>

ALPS21-04 14:15

Quantum Spectroscopy using 2D Spectrum of Telecom-band Frequency Entangled Photons for Quantum Remote Sensing

Masahiro Ishizeki[1], Takeru Naito[1], Takahisa Kuwana[1], Akifumi Asahara[1,2], Ryosuke Shimizu[1,2], Kaoru Minoshima[1,2]
[1]University of Electro-Communications, [2]Institute for Advanced Science, The Univ. of Electro-Communications

Spectroscopy method using frequency correlation of nonlocal entangled photons was developed. The principle of indirect spectroscopy was verified by sample with known spectral characteristics, which leads to quantum remote sensing application through real-world fiber network.

ALPS21-05 14:30

Parallelization of temporally multiplexed matrix-vector multiplication with distribute feedback based on Rayleigh backscattering in an optical fiber

Daichi Hitotsumatsu[1], Kaoru Minoshima[1,2], Naoya Kuse[1]
[1]Tokushima University, [2]The University of Electro-Communications

We simultaneously execute two nonlinear principal component analyses by parallelizing temporally multiplexed matrix-vector multiplication, which is based on Rayleigh backscattering in an optical fiber, aiming for massive parallelization through the use of optical frequency combs.

----- Coffee Break 14:45-15:00 -----

[ALPS22] 15:00-16:15
Optical frequency combs / Frequency stabilized lasers and applications (5)
Chair: Takashi Kato
University Electro-Communications

ALPS22-01 15:00 ***Invited***

Practical Dual Comb Spectroscopy to Improve Energy Systems: Navigating the Interfaces Between Science, Engineering, and Industry

Gregory B Rieker[1,2]
[1]University of Colorado, [2]LongPath Technologies, Inc.

I will describe the journey of frequency comb laser technology from a laboratory novelty to various applications, including detecting methane emissions across hundreds of square kilometers of oil and gas infrastructure and exploring chemical reactions.

ALPS22-02 15:30

Measurement of detailed single-photon ultra-fast pulse characteristics by asynchronous optical sampling using a dual-wavelength combs

Hajime Komori[1], Prasad Koviri[1], Masahiro Ishizeki[1], Haochen Tian[1,2], Thomas R Schibli[3], Takashi Kato[1,4], Akifumi Asahara[1,4], Ryosuke Shimizu[1,4], Kaoru Minoshima[1,4]
[1]Graduate School of Informatics and Engineering, The University of Electro-Communications, [2]JSPS International Research Fellow, [3]University of Colorado Boulder, Boulder, [4]Institute for Advanced Science, The University of Electro-Communications

We developed an asynchronous optical sampling technique for single-photon time-resolved cross-correlation measurements using a dual-wavelength comb. We obtained the detailed frequency chirp temporal characteristics of the single-photon Er-comb ultrashort pulses.

ALPS <Room 511+512>

ALPS25-03 14:15

Dual-Wavelength Diode Laser Injection-Locked for Quantum Cryptography

Yung-Hsuan Li[1], Szu-En Lai[1], Chih-Hsien Cheng[3], Atsushi Matsumoto[3], Kouichi Akahane[3], Gong-Ru Lin[1,2]
[1]National Taiwan University, [2]NTU-Tektronix Joint Research Center, Tektronix Inc. and National Taiwan University, [3]National Institute of Information and Communications Technology

A dual-mode diode laser is master-to-slave injection-locked for wavelength switchable single-photon DPS-QKD transmission at a clock rate of 1 Gbit/s with interferometric visibility of 99.2% for stabilized decoding over 3000 seconds.

ALPS25-04 14:30

Loss tolerant protocol for GHZ-state distribution in a star optical network

Hikaru Shimizu, Wojciech Roga, Masahiro Takeoka
Keio University

We propose an efficient protocol for the distribution of GHZ-state which is a type of multipartite entanglement . We also analyse the performance of our protocol under realistic conditions.

ALPS25-05 14:45

Proposal for a robust single-photon interference-based quantum repeater

Daisuke Yoshida[1,2], Tomoyuki Horikiri[1,2]
[1]Yokohama National University, [2]LQUOM Inc.

We propose a quantum repeater scheme based on single-photon interference using multimode quantum memory. The proposed scheme reduces the stability requirement by several orders of magnitude compared to conventional schemes.

----- Coffee Break 15:00-15:15 -----

[ALPS26] 15:15-17:15
Quantum optics and their applications (3)
Chair: Ryosuke Shimizu
The University of Electro-Communications

ALPS26-01 15:15 ***Invited***

Quantum operation using nonlinear interaction between single photons

Yoshiaki Tsujimoto
National Institute of Information and Communications Technology

The nonlinear interaction between single photons is a key building block in photonic quantum information processing. In this presentation, I talk about two research topics using such nonlinear interactions: the quantum interference and single-photon nonlinearity.

BISC <Room 419>

[BISCp]

Poster session program p.149-

----- Coffee Break 15:00-15:30 -----

[BISC7] 15:30-17:00
Session 7
Chair: Dalip Singh Mehta
Institute of Technology

BISC7-01 15:30

Development of Multi-view Optical Coherence Tomography (OCT)and Image Registration Algorithm for Tooth Imaging

Zi-Wen Kao[1], Pei - Chen Sung[1], Fang - Ying Hua[2], Chuan - Bor Chueh[1], Heng - Yu Li[1], Ting - Hao Chen[1], Yin - Lin Wang[2], Hsiang - Chieh Lee[1,3]
[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, [2]Department of Dentistry, National Taiwan University Hospital, [3]Department of Electrical Engineering, National Taiwan University

In this study, we developed a high-speed Swept-Source OCT for volumetric tooth imaging. Utilizing a dual-axis goniometer, we captured multi-view images and applied ICP-based stitching algorithm to eliminate artifacts caused by inherent optical properties of teeth.

BISC7-02 15:45

Full-eye imaging using swept-source OCT based on HCG-VCSEL

Chien-Hua Peng[1], Jian-Zhi Wang[1], Kuang-Lei Huang[1], Ting-Hao Chen[1], Jyh-Tsung Hsieh[2], Hsiang-Chieh Lee[1]
[1]National Taiwan University, [2]Bandwith10 Ltd.

In this research, we have developed a dedicated full eye imaging system employing HCG-VCSEL, an alternative cost-effective option for SS-OCT light source. The phase linearity and stability of the light source were assessed. The whole eye model OCT image and the evaluation of the axial length of the model eye verify the feasibility to use HCG-VCSEL in ophthalmology.

HEDS <Room 311+312>

HEDS9-04 14:30

Global MHD simulations of accretion onto a protostar from an MRI-turbulent disk

Shinsuke Takasao[1], T. Hosokawa[2], K. Tomida[3]
[1]Osaka University, [2]Kyoto University, [3]Tohoku University

We examine how gas accretes from a magnetized accretion disk onto a protostar, using 3D magnetohydrodynamic simulations. Our simulations show that the protostar is easily strongly magnetized as a result of the interaction with the disk.

HEDS9-05 14:45

Particle acceleration in scaled kinetic simulations of high-energy-density plasmas

Samuel Richard Totorica[1,2], Kirill Lezhnin[3], Will Fox[1,3]
[1]Princeton University, [2]National Institutes of Natural Sciences, [3]Princeton Plasma Physics Laboratory

We develop a method for accurately modelling particle collisionality in scaled kinetic simulations of high-energy-density plasmas.

HEDS9-06 15:00

High-energy neutrino emission from collisionless shocks in black hole coronae

Minh Nhat Ly[1], Takayoshi Sano[1], Yoshiyuki Inoue[2,3,4], Youichi Sakawa[1], Yasuhiko Sentoku[1]
[1]Institute of Laser Engineering, Osaka University, [2]Department of Earth and Space Science, Graduate School of Science, Osaka University, [3]Interdisciplinary Theoretical & Mathematical Science Program (iTHEMS), RIKEN, [4]Kavli Institute for the Physics and Mathematics of the Universe (WPI), UTIAS, The University of Tokyo

Diffusive shock acceleration scenario has been proposed to explain proton acceleration leading to high-energy neutrino production in black hole corona. Here, we employ PIC simulations of collisionless shocks using parameters derived from NGC 1068 coronae to thoroughly examine this scenario.

----- Coffee Break 15:15-15:35 -----

Oral, Thursday, 25 April PM

IP <Room 414+415>

[IPp]

Poster session program p.151-

LDC <Room 301>

[LDCp]

Poster session program p.152

LEDIA <Room 211+212>

LEDIA6-05 14:15

Thickness Dependence on Crystallinity of (11-22) AlN Thin Films Fabricated by Sputtering and Annealing Method

R. Akaike[1], D. Kobayashi[2], T. Nakamura[3], H. Miyake[4]
[1]ORIP, [2]Fac. of Eng., [3]MRPCO, [4]Grad. Sch. of Eng. Mie University

Semipolar face-to-face annealed sputter-deposited AlN (FFA Sp-AlN) are expected to achieve high crystallinity and light extraction efficiency. We evaluated the thickness dependence of crystallinity on (11-22) FFA Sp-AlN by X-ray diffraction (XRD) method.

LEDIA6-06 14:30

Using solid AlCl3 for homoepitaxial growth of thick AlN layers by HVPE

T. Nukaga[1], H Sakano[2], T. Nishida[2.1], T. Kai[1], M. M. Tsuchiya[1], K. Sasakura[1], Y. Y. Kumagai[2]
[1]Stanley Electric Co., Ltd, [2]Tokyo University of Agriculture and Technology

HVPE-AlN layers were grown on +c planes of PVT-AlN(0001) substrates using solid AlCl3 (5N grade) as Al source. Crystal quality of these HVPE-AlN layers was found to be comparable to that of PVT-AlN substrates.

----- Coffee Break 14:45-15:00 -----

[LEDIA7] 15:00-16:15
Photo detectors
Chair: T. Takeuchi
Meijo Univerisity

LEDIA7-01 15:00 ***Invited***

Perovskite solar cells: Candidates as photoreceivers for optical wireless power transmission

Ryousuke Ishikawa
Tokyo city University

Perovskite solar cells are attracting much attention as next-generation solar cells. In this lecture, I will introduce the basics and latest trends of perovskite solar cells, and then discuss our optical wireless power transmission (OWPT) application example.

LEDIA-CL 15:30

Closing Remarks

Narihito Okada[1], Tohru Honda[2]
[1]Yamaguchi University, [2]Kogakuin University

LSC <Room 421>

LSC5-04 14:15 ***Invited***

Applied Research using Synchrotron Mössbauer Source on BL11XU at SPring-8

Kosuke Fujiwara, Takaya Mitsui
National Institutes for Quantum Science and Technology

The synchrotron radiation Mössbauer spectroscopy station, which generates high brilliant Mössbauer γ-rays, is installed on BL11XU at SPring-8. Unlike γ-rays from radioactive isotope (RI) source, this γ-ray has a small divergence and purely linear polarization. We will introduce applied research using this γ-ray, focusing on microspectroscopy and grazing incidence spectroscopy.

LSC5-05 14:35

Terahertz-Streaking Method for Electron Pulse Duration Measurements

Ryota Nishimori[1], Godai Noyama[1], Wataru Yajima[1], Yusuke Arashida[1], Kou Takubo[2], Shin-ya Koshihara[2], Shoji Yosida[1], Masaki Hada[1]
[1]University of Tsukuba, [2]Tokyo Tech

Ultrafast time-resolved electron diffraction measurements have directly clarified the atomic-level structural dynamics triggered by photoexcitation on the femto-to-picosecond time scale. We are measuring an extremely short electron pulse duration (under 100fs), which determines the time resolution of the setup, using the electric field of THz pulses (THz streaking method).

LSC5-06 14:50

Time-resolved experiments using unique pulse structure at the SPB/SFX scientific instrument of the European XFEL

Tokushi Sato[1], R. Letrun[1], J. Koliyadu[1], V. Bellucci[1], J. Bielecki[1], C. Kim[1], Y. Kim[1], R. de Wijn[1], S. Birnsteinova[1], J. E.[1], A. Round[1], M. Sikorski[1], P. Vagovič[1,2], R. Bean[1]
[1]European XFEL GmbH, [2]Center for Free-Electron Laser Science (CFEL), DESY

Recently, MHz X-ray microscopy was established and opened for user program at the SPB/SFX instrument of the EuXFEL. This talk will discuss on fundamental instrumentation and introduce microsecond measurements.

----- Coffee Break 15:05-15:25 -----

[LSC6] 15:25-17:25
New materials, techniques, and theory (1)
Chair: Kosuke Fujiwara
National Institutes for Quantum Science and Technology

LSC6-01 15:25 ***Invited***

Time- and space-resolved soft X-ray measurement for magnetization dynamics

Yuta Ishii
Tohoku University

We recently established time- and space-resolved soft X-ray measurements for the detection of spin waves in magnetic thin film samples. In my presentation, I'd like to introduce this technique and some experimental results.

Oral, Thursday, 25 April PM

LSSE <Room 316>

LSSE10-04 14:40

Miniaturized Laser Heads for Quantum Sensing Applications in Space

Ahmad Bawamia, Jan Markus Baumann, Jonas Strobelt, Karl Häusler, Christian Kürbis, Andreas Wicht
Ferdinand-Braun-Institut (FBH), Leibniz-Institut fuer Hoechstfrequenztechnik

We present our miniaturized lasers tailored for high-end quantum sensing applications in space, based on requirements such as optical output power, narrow linewidth, frequency agility, suppression of amplified spontaneous emission and optical feedback.

----- Coffee Break 15:00-15:30 -----

[LSSE11] 15:30-16:30
Space Technology 4
Chair: Norihito Saito
RIKEN

LSSE11-01 15:30 *Invited*

(TBD)

Daisuke Sakaizawa
JAXA

(TBD)

OMC <Room 418>

[OMCp]

Poster session program p.152-

[OMC11] 15:00-17:00
Session 9
Chairs: Peter Barker
University College London
Ken-Ichi Yuyama
Osaka Metropolitan University

OMC11-01 15:00

A proposed design strategy of chirality-enhanced gap antennas using topology optimization

Atsushi Taguchi, Keiji Sasaki
Hokkaido University

We present that a chiral nanostructure, designed using topology optimization, can amplify optical chirality within a nano-confined nano-volume. The chirality enhancement was elucidated with a continuous fluid model of light's spin angular momentum, which led to a design strategy for highly efficient chiral nanostructures.

OMC11-02 15:30

Manipulation of Vibrational States of CO_2 with Mid-Infrared Pulses

Ikki Morichika, Hiroki Tsusaka, Satoshi Ashihara
The University of Tokyo

We demonstrate vibrational ladder climbing of carbon dioxide by using intense mid-infrared pulses. The transient absorption spectroscopy confirms excitation up to the v = 9 state in a liquid phase. This result makes an important step toward controlling carbon dioxide conversions.

OMC11-03 15:45

Detection of a polarized emission of fluorescent molecules on a plasmonic chip

Keiko Tawa, Yuma Yoshida, Yasunori Nawa
Kwansei Gakuin University

More than 500-fold enhanced fluorescence intensity of Cy5 interacted with biotin immobilzed to the plasmonic chip was observed with the circularly polarized incident light. The prominent polarized emission of Cy5 was also observed in 480 nm-pitch plasmonic chip.

OWPT <Room 304>

OWPT7-04 14:30

3-junction InGaAs solar cells for optical wireless power transmission

Reo Aoyama[1], Shunsuke Shibui[1], Kousuke Watanabe[1], Junichi Suzuki[1], Ryota Warigaya[1], Kouichi Akahane[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]National Institute of Information and Communications Technology

We investigated the conversion efficiency for optical wireless power transmission using 3-junction InGaAs solar cells. When irradiated with 1550 nm laser light,we obtained a conversion efficiency of 24.1% due to the 3-junction solar cell structure.

OWPT7-05 14:45

Evaluation of properties of $CsPb(Br_{1-x}Cl_x)_3$ films as light absorbing layer in photovoltaic power converter for blue light source

Atsuto Watanabe, Shinsuke Miyajima
Tokyo Institute of Technology

We successfully deposited a $CsPb(Br_{1-x}Cl_x)_3$ film with a bandgap of 2.7 eV for blue-light (455 nm) photovoltaic power converter. The Cl/(Br+Cl) ratio of the film was found to be about 55%.

----- Coffee Break 15:00-15:30 -----

[OWPT8] 15:30-17:00
Session 8
Chair: Masakazu Arai
Univ. of Miyazaki

OWPT8-01 15:30 *Invited*

Near-UV photoelectric transducers for OWPT systems based on GaInN multiple quantum-well structures

Makoto Miyoshi
Nagoya Institute of Technology

This paper presents our recent results of GaInN-based photoelectric transducers for OWPT systems. Herein, the fabricated devices exhibited a high power conversion efficiency of approximately 44% at near-UV illuminations.

SLPC <Room 416+417>

----- Coffee Break 14:30-14:45 -----

[SLPC11] 14:45-15:30
Welding 2
Chairs: Jörg Volpp
Luleå University of Technology
Yuji Sato
Osaka University

SLPC11-01 14:45 *Invited*

Laser welding of copper by high-power visible laser

Daisuke Nakamura[1], Toshifumi Kikuchi[1], Ryuma Takabatake[1], Masahiro Koba[1], Rikuto Kokubo[1], Hiroshi Ikenoue[2]
[1]Kyushu University, [2]Kochi University of Technology

The weld cross section and spatter generation in hairpin welding of copper wire using blue and green lasers were investigated.

SLPC11-02 15:15

Elucidation of the effect of blue diode laser preheating on lap welding of pure copper using blue-IR hybrid laser

Shumpei Fujio[1], Yuya Koyama[2], Mao Sudo[1], Keisuke Takenaka[3], Yuji Sato[3], Minoru Yoshida[2], Masahiro Tsukamoto[3]
[1]Graduate School of Engineering, Osaka University, [2]Faculty of Science and Engineering, Kindai University, [3]Joining and Welding Research Institute, Osaka University

Lap welding of pure copper was conducted with a blue-IR hybrid laser. Through the experiment, the effect of the blue diode laser preheating on the lap welding of pure copper was elucidated.

----- Coffee Break 15:30-15:45 -----

[SLPC12] 15:45-16:45
Functional Surface Manufacturing / Others
Chairs: Miho Tsuyama
Kindai University
Rie Tanabe
Fukuoka Institute of Technology

SLPC12-01 15:45

Temperature and surface tension of laser-induced falling drops

Joerg Volpp
Luleå University of Technology

Both the falling drop and surface wave analysis were used to determine surface tension values in this work. Surface waves could be related to the surface temperature, which gives high temperature surface tension values. By measuring the surface tension of a falling drop and comparing this value to the determined relation from the surface wave analysis, the surface temperature of the drop could be indirectly estimated.

Oral, Thursday, 25 April PM

TILA-LIC <Room 315>

[TILA-LICp]

Poster session program p.153

----- Coffee Break 15:00-15:30 -----

[TILA-LIC7] 15:30-17:00
Laser Sources - 2
Chair: Gerhard Kroupa
Silicon Austria Labs (SAL), Villach, Austria

TILA-LIC7-01 15:30 ***Invited***

Development and prospect of compact terahertz free electron lasers
Young Uk Jeong[1,2], Kyu-Ha Jang[1], Varun Pathania[1,2], Myung Jin Bae[1,2], Hyun Woo Kim[1], Kitae Lee[1,2]
[1]Korea Atomic Energy Research Institute - KAERI, South Korea, [2]University of Science and Technology
This study examines the potential of compact THz FEL technology to meet market needs. An FEL system with an average power of 1 W operating in the THz center wavelength range of 300–600 μm is expected to be realized in an FEL with a size of 1.5 m × 2 m.

XOPT <Room 313+314>

[XOPT9] 14:55-16:00
Applications
Chair: Mikako Makita
European XFEL

XOPT9-01 14:55

Capabilities of Time-resolved X-ray excited optical luminescence of TPS 23A X-ray nanoprobe via hybrid bunch mode
Bi-Hsuan Lin[1], Tzu-Chi Huang[2,1], Yu-Hao Wu[3,1], Wei-Lon Wei[1], Chien-Yu Lee[1], Bo-Yi Chen[1], Gung-Chian Yin[1], Mau-Tsu Tang[1]
[1]National Synchrotron Radiation Research Center, Hsinchu 300092, Taiwan, [2]Department of Chemical Engineering, National United University, Miaoli, 360302, Taiwan, [3]Department of Materials Science and Engineering, National Yang Ming Chiao Tung University, Hsinchu 30010, Taiwan
We anticipate that X-ray nanoprobes will open new avenues with significant characterization ability for unravelling the emission mechanisms of light-emitting materials.

XOPT9-02 15:10

Exploring Quantum Properties of GGG Wafer Using TPS 23A Hard X-ray Nanoprobe:Integration of HB-T Interferometer and Insights into Single Photon Sources
Tzu-Chi Huang[1,2], Yu-Hao Wu[3,2], Wei-Lon Wei[2], Chien- Yu Lee[2], Bo-Yi Chen[2], Gung-Chian Yin[2], Han-Wei Chang[1], Mau-Tsu Tang[2], Bi-Hsuan Lin[2]
[1]National United University, [2]National Synchrotron Radiation Research Center, [3]National Yang Ming Chiao Tung University
This study employs the TPS 23A beamline to investigate the quantum properties of GGG wafer, aiming to develop high-brightness and high-efficiency single photon sources for quantum technology applications. Current findings reveal that GGG wafer (chemical formula: $Gd_3Ga_5O_{12}$) exhibit different XEOL emission wavelengths between different crystal orientations under X-ray irradiation, intensifying with increased exposure to strongly focused X-rays.

XOPT9-03 15:25

First principle lineshape fitting of Compton X-rays for XRF spectroscopy
Bryan Pi Ern Tee
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
The feasibility of using first-principle line shapes of the Compton peaks in XRF spectroscopy will be discussed in this presentation.

XOPT9-04 15:40

Using Shifting Based Automatic X-ray Inspection System to Estimate the Wire Thickness by Digital Tomosynthesis
Yu-Hsuan Chien[1], Chieh Shen[1], Shih-Chun Jin[1,2], Kun-Long Shih[2], Chia-Wei Wang[1], Jyh-Cheng Chen[1]
[1]National Yang Ming Chiao Tung University, [2]National Taipei University of Technology
Automatic X-ray inspection (AXI) is crucial for printed circuit board (PCB) quality inspection, utilizing shift-and-add (SAA) for 2.5D reconstruction. Results reveal quantitative analyses, addressing X-ray challenges, providing insights for future industrial inspection optimization.

Oral, Thursday, 25 April PM

ALPS <Room 303>

ALPS22-03 15:45

Self-calibrated free-running dual-comb ranging using subsampled repetition frequency information

Qiuying Ma[1], Haoyang Yu[2], Kai Ni[1]
[1]Tsinghua University, [2]Central South University

We introduced a self-calibration technique that can directly extract the subsampled repetition frequency information from the interferograms. With this technology, a real-time calibration of free-running dual-comb ranging can be achieved without extra repetition frequency detection module.

ALPS22-04 16:00

Phase stabilization of an optical interferometer using two lasers at differenet wavelengths for entanglement distribution

Yohei Sugiyama[1], Riho Amaki[1], Yuto Shitaka[1], Tomoki Tsuno[1,2], Daisuke Yoshida[1,2], Koji Nagano[2], Tomoyuki Horikiri[1,2], Feng-Lei Hong[1], Daisuke Akamatsu[1]
[1]Yokohama National University, [2]LQUOM Inc.

We demonstrated phase stabilization of an optical interferometer by using two lasers at different telocom wavelengths for entanglement distribution between remote quantum repeater nodes.

----- Coffee Break 16:15-16:30 -----

ALPS <Room 511+512>

ALPS26-02 15:45

Simple quantum state tomography of single-photon entanglement

Joe Yoshimoto[1], Hikaru Shimizu[1], Junko Ishi Hayase[1], Ikuta Rikizo[2], Masahiro Takeoka[1]
[1]Keio University, [2]Osaka University

We propose a simple and loss tolerant quantum state tomography of photon-number entanglement. It requires only local measurements and thus is relevant for quantum communication applications.

ALPS26-03 16:00

Quantum frequency conversion on thin film lithium niobate platform

Xina Wang[2], Ming-Yang Zheng[1]
[1]Jinan Institute of Quantum Technology, [2]University of Science and Technology of China

In this work, we demonstrate a low-noise quantum frequency conversion (QFC) process on thin film lithium niobate (TFLN) nanophotonic platform designed to connect telecom and near-visible bands with sum-frequency generation by long-wavelength pumping.

ALPS26-04 16:15

Development of cavity two-photon sources for implementation of long-distance quantum communication

Tomoki Tsuno[1,2], Riku Sasaki[1], Hiroki Tateishi[1], Daisuke Yoshida[1,2], Kazuya Niizeki[2], Koji Nagano[2], Daisuke Akamatsu[1], Feng-Lei Hong[1], Tomoyuki Horikiri[1,2]
[1]Yokohama National University, [2]LQUOM, Inc

We are developing cavity two-photon sources for the Quantum Internet and will discuss our latest progress to utilize these sources for entanglement generation between two distant quantum memories.

BISC <Room 419>

BISC7-03 16:00

Dynamic imaging of the lung carcinoma (CA) cell spheroid with optical coherence microscopy (OCM) technology

Pei-Chin Huang[1], You-Nan Tsai[1], Yin-Shen Cheng[1], Yu-Chun Lin[2], Yoshiaki Yasuno[3], Hsiang-Chieh Lee[1,4]
[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei 10617, Taiwan, [2]Graduate Institute of Medical Device and Imaging, National Taiwan University, Taipei 10617, Taiwan, [3]Computational Optics Group, University of Tsukuba, Tsukuba, Japan, [4]Department of Electrical Engineering, National Taiwan University, Taipei, 10617 Taiwan

In this study, we have developed a compact, high-speed spectral-domain optical coherence microscopy (SD-OCM) system for examining lung carcinoma (CA) tumor cell spheroids, that is equipped with a dynamic image analysis algorithm.

BISC7-04 16:15

Theoretical and numerical investigation of intracellular dynamic and its influence on dynamic optical coherence tomography signals

Yuanke Feng[1], Shumpei Fujimura[1], Yiheng Lim[1], Thitiya Seesan[1], Rion Morishita[1], Ibrahim Abd El-Sadek[1,2], Pradipta Mukherjee[1], Yoshiaki Yasuno[1]
[1]The University of Tsukuba, [2]Damietta University

In this study, we proposed a DOCT signal simulator using mathematical modeling of intracellular activities. Numerical simulation was performed by using the mathematical model to recapitulate the specific temporal fluctuation of OCT signals. After computing two DOCT contrasts, the relationship between the DOCT signals and the tissue activities was investigated.

HEDS <Room 311+312>

[HEDS10] 15:35-17:00
Particle Acceleration 3
Chair: Natsumi Iwata
Osaka University

HEDS10-01 15:35 ***Invited***

Laser-driven x-ray sources for high energy density science at the Jupiter Laser Facility

Félicie Albert
LLNL

We present recent experimental developments of x-ray sources based on laser-plasma interaction at the Jupiter Laser Facility. They are developed for applications including non-destructive imaging and high energy density science at several LaserNetUS facilities.

HEDS10-02 16:00

Bright Gamma Flash Generation and Detection

Alexander Pirozhkov[1], A. Sagisaka[1], K. Ogura[1], T. Zh. Esirkepov[1], B. Gonzalez Izquierdo[1], E. A. Vishnyakov[2], C. Armstrong[3], T. A. Pikuz[4,11], C. Arran[5], S. A. Pikuz[6], W. Yan[7], T. M. Jeong[2], S. Singh[8], P. Hadjisolomou[2], O. Finke[2], G. Grittani[2], M. Nevrkla[2], C. Lazzarini[2], A. Velyhan[2], T. Hayakawa[1], Y. Fukuda[1], J. K. Koga[1], M. Ishino[1], Ko. Kondo[1], Y. Miyasaka[1], A. Kon[1], M. Nishikino[1], Y. V. Nosach[9], D. Khikhlukha[2], I. P. Tsygvintsev[10]
[1]KPSI QST, [2]ELI-BL, [3]CLF RAL, [4]Osaka University, [5]University of York, [6]HB11 Energy Holdings, [7]Shanghai Jiao Tong University, [8]Institute of Plasma Physics ASCR, [9]Institute of Physics NASU, [10]ISTEQ AR, [11]Osaka University

Gamma Flash is one of the most promising laser-plasma interaction regimes with predicted 30-40% conversion efficiency to γ rays. We generated γ-Flash with the J-KAREN-P laser. Here we describe achieving high on-target intensity (~10^{22} W/cm^2), an experimental method to separate γ-Flash from Bremsstrahlung, and γ-Flash spectral shape reconstruction using scintillator stack spectrometer.

HEDS10-03 16:15

Study on picosecond measurement of relativistic electron impact ionization inside solids

Masato Ota[1,2,3], Koichi Kan[4,5], Yasunobu Arikawa[3], Makoto Nakajima[3]
[1]National Institute for Fusion Science, [2]The Graduate University for Advanced Studies, [3]Institute of Laser Engineering, Osaka University, [4]National Institutes for Quantum Science and Technology, [5]Institute of Scientific and Industrial Research

Relativistic beam-solid interaction is investigated by electro-optic (EO) sampling. We inject a high-energy electron beam into an EO crystal and measure picosecond spatiotemporal evolution of electron impact ionization and subsequent avalanche effect inside the crystal.

Oral, Thursday, 25 April PM

LSC <Room 421>

LSC6-02 15:45 *Invited*

Advancement of data analysis at SPring-8 by Synchrotron Radiation Data-driven-science Group

Yuichi Yokoyama[1], Masaichiro Mizumaki[1,2], Osami Sakata[1]
[1]Japan Synchrotron Radiation Research Institute, [2]Kumamoto University

Synchrotron Radiation Data-driven-science Group was established in January 2023 to develop innovative analysis methods and incorporate them into beamlines at SPring-8. In this talk, we introduce our activities about spectrum analysis and image processing.

LSC6-03 16:05 *Invited*

Electronic coherence time in n-type gallium arsenide

Kazutaka Nakamura[1], Yosuke Kayanuma[2], Itsuki Takagi[1]
[1]Tokyo Institute of Technology, [2]Osaka Metropolitan University

Electronic coherence time in n-type gallium arsenide is determined by using ultrafast quantum-path interferometry with quantum mechanical calculations. Its temperature dependence is discussed in terms of electron interaction with carriers, phonons and impurities.

LSC6-04 16:25 *Invited*

Band structure modification through high pressure application for tunable luminescence in fluoride crystals

Marilou Cadatal Raduban[1,2], Luong Viet Mui[3], Masahiro Yamashita[2], Yuki Shibazaki[4], Nobuhiko Sarukura[2,5], Kohei Yamanoi[2]
[1]Centre for Theoretical Chemistry and Physics, Massey University, [2]Institute of Laser Engineering, Osaka University, [3]Graduate School of Engineering, Osaka University, [4]Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), [5]New Industry Creation Hatchery Center (NICHe), Tohoku University

Fast decay emission from cross-luminescence (CL) in wide band gap fluoride crystals are in the vacuum ultraviolet (VUV) wavelength region. The ability to shift VUV luminescence to UV will enable easier detection of the fast emission. Uniform volume compression through hydrostatic high-pressure applications decreases the energy gap between the valence and core bands of KMgF and BaF crystals, potentially shifting their CL emission from 200nm (VUV) to 300nm (UV).

Oral, Thursday, 25 April PM

LSSE <Room 316>

LSSE11-02 16:00 *Invited*

Space Debris Solution with Space-based pulse Laser, and Space LiDAR for Earth Observation

Tadanori Fukushima
Orbital Lasers

We have established a startup "Orbital Lasers co., Ltd" that uses space lasers to remove space debris and measure surface altitude of the earth. In this talk, we will show how we use lasers.

OMC <Room 418>

OMC11-04 16:00 *Invited*

Levitodynamic spectroscopy for single nanoparticle characterisation

Peter Barker
University College London

In this talk, I will describe a new non-intrusive characterisation method for optically trapped nanoparticles, based on the measurement of their rotational and oscillatory motion when levitated at low pressure.

OMC11-05 16:30

Microspectroscopic analysis of a single liquid dropletformed by optical tweezers in a temperature responsive ionic liquid

Rai Kobayashi
Osaka Metropolitan University

We demonstrate single droplet formation in a temperature responsive ionic liquid/water mixture by optical tweezers. Upon focusing a near-infrared laser beam into the mixture, a liquid droplet is formed at the focal spot due to optical trapping and laser heating. The concentration of the droplet depends on its size and the initial solution concentration. We also show that molecules can be extracted to the droplet, which is applicable to microanalysis.

OMC11-06 16:45

Levitation dynamics of mesoscopic absorbing particles in a 3D photophoretic trap

Anita Pahi, Ayan Banerjee
IISER KOLKATA

Our study shows interesting dynamics of mesoscopic particles in a photophoretic trap formed by a Gaussian beam. Trapped particles rotate with their rotation frequency being proportional to the trapping force. Some exhibit axial orbital rotation inversely linked to rotation frequency, revealing intricate equilibrium dynamics with particle-morphology dependence.

OWPT <Room 304>

OWPT8-02 16:00

Study of Laser Power Converters based on GaN for High Power Applications

Javier F. Lozano[1], Natalia Seoane[1], Enrique Comesaña[2], Florencia Almonacid[3], Eduardo F. Fernández[3], Antonio García-Loureiro[1]
[1]Centro Singular de Investigación en Tecnoloxías de Información (CiTiUS), Departamento de Electrónica e Computación, Universidade de Santiago de Compostela, [2]Escola Politécnica Superior de Enxeñaría, Campus Terra, Universidade de Santiago de Compostela, Lugo, [3]Advances in Photovoltaic Technology (AdPVTech), CEACTEMA, University of Jaén

To overcome the main limitations of the high power laser transmission technology, we present modeled laser power converters made of gallium nitride, which open a path to broaden the applications in extreme environmental conditions.

OWPT8-03 16:15

Incident Laser Wavelength dependence of temperature characteristics of InGaN solar cells for optical wireless power transmission

Junichi Suzuki[1], Shunki Hayashi[1], Shunsuke Shibui[1], Masahiro Koga[1], Ryusei Takahashi[1], Reo Aoyama[1], Takahiro Noguchi[1], Takahiro Fujisawa[2], Toshihiko Fukamachi[3], Koichi Naniwae[3], Shiori Ii[4], Ruka Watanabe[4], Makoto Miyoshi[2], Tetsuya Takeuchi[4], Satoshi Kamiyama[4], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Nagoya Institute of Technology, [3]Ushio Inc, [4]Meijyo University

We evaluated the incident laser wavelength dependence of temperature characteristics of InGaN solar cells. The results showed that the shorter the wavelength and the higher the temperature, the higher the conversion efficiency.

OWPT8-04 16:30

Effective placement methods of light source infrastructure for dynamic EV charging using optical wireless power transmission

Mahiro Kawakami, Yusuke Suda, Tomoyuki Miyamoto
Tokyo Institute of Technology

OWPT is an effective method for dynamic charging of electric vehicles because OWPT is suitable for long-distance power transmission. To design effective light source placement methods, an infrastructure design simulator for OWPT was built, and the advantage of placing the light source near the deceleration point on the remaining battery capacity was clarified.

OWPT8-05 16:45

Suppression of water wave effects in blue laser-based underwater-to-air OWPT by a fly-eye lens system

Tatsuhisa Koiwa, Yamato Takahashi, Tomoyuki Miyamoto
Tokyo Institute of technology

Underwater OWPT is expected to significantly expand the field of underwater applications. To overcome the limit of long-distance underwater light propagation caused by a still relatively large propagation loss, a system that propagates the beam between underwater and the air with low loss is attractive. The use of a fly-eye lens system to suppress the influence of water waves has been proposed, and its effectiveness has been confirmed by simulation and experiment.

SLPC <Room 416+417>

SLPC12-02 16:00 *Invited*

Formation of periodic nanostructures on medical polymer surface with femtosecond laser irradiation

Keisuke Takenaka, Yuji Sato, Masahiro Tsukamoto
Joining and welding research institute, Osaka university

Periodic nanostructures were formed on the interface between the medical polymer (poly- lactic acid) film and a titanium plate surface by using the femtosecond laser at the wavelength of 800 nm.

SLPC12-03 16:30

Laser-induced Local Nitridation of Aluminum in Hydrogen-Mixed Nitrogen Gas

Haruto Mizuno[1], Shigek Matsuo[1], Toshiaki Kondo[2]
[1]Shibaura Institute of Technology, [2]Aichi University of Technology

Laser-induced nitridation of Aluminum was attempted under hydrogen-mixed nitrogen gas. Using X-ray photoelectron spectroscopy, nitrogen was detected on the surface, which suggests that nitridation has occurred.

[SLPC-CL] 16:45-17:00
Award & Closing Remark
Chairs: Masahiro Tsukamoto
Osaka University
Yuji Sato
Osaka University

Oral, Thursday, 25 April PM

TILA-LIC <Room 315> | XOPT <Room 313+314>

XOPT-CL 15:55

Closing Remarks

TILA-LIC7-02 16:00

Fiber-coupled high energy, low-cost Nd:YAG laser for ablative ignition applications

Tibor Bereczki, Gerhard Kroupa, Barbara Menezes de Oliveira, Dmitry Tabakaev
Silicon Austria Labs GmbH

A small fiber-coupled high energy laser system could be a solution for ablation-based ignition systems. In this work, we are presenting a compact, low-price, high-energy Q-Switched Nd:YAG laser with a directly attached optical fiber.

TILA-LIC7-03 16:15

Fiber beam delivery system for ns high-energy pulses

Dmitry Tabakaev, Barbara Nicoly Menezes de Oliveira, Tibor Bereczki, Gerhard Kroupa
Photonics systems, Silicon Austria Labs

We experimentally demonstrated that thick cladding multimode optical fibers allow for almost 100% energy coupling efficiency, the highest damage threshold up to 16 mJ at 2 ns pulses even when bent to 150 mm radius.

TILA-LIC7-04 16:30 ***Invited***

Modeling of an Erbium-doped ZBLAN fiber laser including ion clustering

Junha Jung, Ju Han Lee
University of Seoul, South Korea

Our recent research activities on modeling of an highly-doped Er:ZBLAN fiber laser are reviewed. Our model with ion clustering effect is shown to provide the calculation results in good agreement with the experimental ones without using weak interaction parameters.

Oral, Thursday, 25 April PM

ALPS <Room 303>

[ALPS23] 16:30-17:30
Optical frequency combs / Frequency stabilized lasers and applications (6)
Chair: Sho Ookubo
National Institute of Advanced Industrial Science and Technology

ALPS23-01 16:30 ***Invited***

Dual-Comb Spectroscopy from the IR to the Deep Ultraviolet for Characterization of Laser Plasmas
Jason Jones
The University of Arizona
We utilize time-resolved dual-comb spectroscopy from the IR to the deep ultraviolet to measure evolving ionic, atomic, and molecular species within laser plasmas. Key parameters including atomic and molecular temperatures and electron densities are characterized.

ALPS23-02 17:00

Dispersive interference ellipsometry with line-field configuration
Jinxu Zhang, Liheng Shi, Lizong Dong, Guanhao Wu
Tsinghua University
We demonstrate a line-field dispersive interference ellipsometry utilizing an anisotropic crystal, measuring the birefringent phase of a quarter-wave plate and SiO_2 film thickness. This method achieves line-field distribution within just 5 ms.

ALPS23-03 17:15

Non-contact Vital Sign Detection Based on Precision and Fast LiDAR
Lizong Dong, Siyu Zhou, Jinxu Zhang, Guanhao Wu
Tsinghua University
We proposed an asynchronous sampling method based on electric pulse of femtosecond lasers. It can achieve a 38μm precision with 1MHz update rate and demonstrate its capability in non-contact vital sign detection.

ALPS <Room 511+512>

ALPS26-05 16:30

Generation of High-Purity Correlated Photons from a Silicon Waveguide using a Gain-Switched Laser Diode
Fan Yang[1], Shogo Kimura[1], Yixin Wang[2], Keiichi Edamatsu[3], Hiroyuki Yokoyama[1], Hirohito Yamada[1], Nobuyuki Matsuda[1]
[1]Graduate School of Engineering, Tohoku University, [2]State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, [3]Research Institute of Electrical Communication, Tohoku University
We demonstrate the generation of correlated photon pairs from a silicon waveguide using a gain-switched laser diode as a pulsed pump laser. We successfully obtained photons with a high spectral purity.

ALPS26-06 16:45

Channel selective quantum frequency conversion
Toshiki Kobayashi[1], Tomoaki Arizono[1], Riku Arao[1], Shigehito Miki[2,3], Fumihiro China[2], Hirotaka Terai[2], Takashi Yamamoto[1], Rikizo Ikuta[1]
[1]Osaka University, [2]National Institute of Information and Communications Technology, [3]Kobe University
We report an experimental demonstration of a channel-selective quantum frequency conversion (QFC) from 780 nm to telecom wavelengths around 1540 nm by selecting one of multiple channels of pump light.

ALPS26-07 17:00

Quantum frequency conversion by PPLN waveguide with resonant structure for the converted mode
Shoichi Murakami[1,2], Toshiki Kobayashi[1,2], Shigehito Miki[3,4], Fumihiro China[3], Hirotaka Terai[3], Takashi Yamamoto[1,2], Rikizo Ikuta[1,2]
[1]Graduate school of Engineering science, Osaka University, [2]Center for Quantum Information and Quantum Biology, Osaka University, [3]Advanced ICT Research Institute, National Institute of Information and Communications Technology, [4]Graduate School of Engineering, Kobe University
We conducted quantum frequency conversion (QFC) in a PPLN waveguide incorporating a resonator structure into the converted mode. We present the noise characteristics and cavity enhancement effect of our device.

BISC <Room 419>

BISC7-05 16:30

Investigation of wavelength and resolution dependency of dynamic optical coherence tomography signals by experimental and simulation approaches
Shumpei Fujimura[1], Ibrahim Abd El-Sadek[1,2], Pradipta Mukherjee[1], Yiheng Lim[1], Thitiya Seesan[1], Rion Morishita[1], Yuanke Feng[1], Yoshiaki Yasuno[1]
[1]University of Tsukuba, [2]Damietta University
We investigate the wavelength and resolution dependency of dynamic optical coherence tomography (DOCT) signals by experimental and simulation approaches. Both approaches suggested that DOCT is highly affected by the wavelength, where shorter wavelength gives higher DOCT.

BISC7-06 16:45

Time-lapse imaging of tumor spheroid drug response by dynamic optical coherence tomography integrated with cell cultivation chamber
Ibrahim Abd El-Sadek[1,3], Rion Morishita[1], Atsuko Furukawa[2], Masato Iwatsuki[2], Shuichi Makita[1], Pradipta Mukherjee[1], Satoshi Matsusaka[2], Yoshiaki Yasuno[1]
[1]Computational Optics Group, University of Tsukuba, Japan, [2]Clinical Research and Regional Innovation, Faculty of Medicine, University of Tsukuba, Japan, [3]Department of Physics, Faculty of Science, Damietta University, Egypt
We demonstrate time-lapse drug response imaging of tumor spheroids by integrating a spheroid cultivation chamber and dynamic optical coherence tomography (DOCT) microscope. This newly integrated system enables high-time-resolution imaging of a living sample. It successfully revealed the fine temporal and spatial responses of human breast cancer (MCF-7) spheroids to paclitaxel and doxorubicin.

HEDS <Room 311+312>

HEDS10-04 16:30

Effect of a plasma mirror on the interactions of intense laser pulses with micron-scale cluster targets
Yuji Fukuda[1], Masato Kanasaki[2], Takafumi Asai[1,2], Chihiro Inoue[1,2], Seiichiro Mochizuki[2], Reona Ozaki[1,2], Keita Toyonaga[2], Kaoru Maekawa[2], Takumi Minami[1,3], Kentaro Sakai[4], Kosuke Himeno[3], Tomoya Taguchi[3], Kazumasa Oda[3], Soichiro Suzuki[3], Fuka Nikaido[3], Kiyochika Kuramoto[3], Toshiharu Yasui[3], Syogo Isayama[5], Syuta Tanaka[6], Atsushi Tokiyasu[7], Hideki Kohri[8], Sergey N. Ryazantsev[8], Tatiana Pikuz[10], Satoshi Kodaira[11], Tomoya Yamauchi[2], Yuki Abe[3], Yasuhiro Kuramitsu[3], Akira Kon[1], Kotaro Kondo[1], Yuji Mashiba[1], Yasuhiro Miyasaka[1], Koichi Ogura[1], Akito Sagisaka[1], Hiromitsu Kiriyama[1]
[1]Kansai Institute for Photon Science (KPSI), National Institutes for Quantum Science and Technology (QST), [2]Graduate School of Maritime Sciences, Kobe University, [3]Graduate school of Engineering, Osaka University, [4]National Institute for Fusion Science (NIFS), [5]Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, [6]College of Science and Engineering, Aoyama Gakuin University, [7]Research Center for Electron Photon Science (ELPH), Tohoku University, [8]Research Center for Nuclear Physics (RCNP), Osaka University, [9]HB11 Energy Holdings Pty Ltd., Australia, [10]Institute for Open and Transdisciplinary Research Initiatives (OTRI), Osaka University, [11]National Institute of Radiological Sciences (NIRS), National Institutes for Quantum Science and Technology (QST)
The effect of a plasma mirror (PM) on the laser-cluster interactions has been clearly visualized for the first time by using the Thomson scattering imaging. With the PM, the accelerated maximum proton energy has been increased up to ~35 MeV. By means of x-ray spectroscopy, after improvement of laser contrast by the PM, the interesting features of Ly_α-, He_α-, and K_α-line profiles of Ar have been observed.

HEDS10-05 16:45

Monoenergetic sub-relativistic ion acceleration with a nanolayer target mounted on large-area suspended graphene
Yasuhiro Kuramitsu[1], Rikimaru Kitamura[1], Naoya Tamaki[1], Takumi Minami[1,2], Kentaro Sakai[1,3], Tomoya Taguchi[1], Fuka Nikaido[1], Soichiro Suzuki[1], Yuki Abe[1], Hideaki Habara[1], Yasunobu Arikawa[1], Akifumi Yogo[1], Alessio Morace[1], Youichi Sakawa[1], Yuji Fukuda[2], Takehito Hayakawa[2], Leonard Dohl[4], Nigel Woolsey[4], Masato Kanasaki[5], Atsushi Tokiyasu[6], Hideki Kohri[1], Satoshi Kodaira[2], Shogo Isayama[7], ShihHung Chen[8], Chemen Chu[8], KengTing Wu[8], YuTzu Liao[8], WeiYen Woon[8]
[1]Osaka University, [2]QST, [3]NIFS, [4]University of York, [5]Kobe University, [6]Tohoku University, [7]Kyushu University, [8]National Central University
Graphene is the thinnest and strongest 2D material, and the large-area suspended graphene (LSG) shows remarkable durability against the laser prepulse and pedestal that potentially destroy such extremely thin targets. We report monoenergetic and energetic ion acceleration with our novel nanolayer target mounted on LSG.

Oral, Thursday, 25 April PM

LSC <Room 421>

LSC6-05 16:45 *Invited*

X-ray Magnetic Circular Dichroism for Antiferromagnets

Norimasa Sasabe
Kumamoto University

Recently, x-ray magnetic circular dichroism (XMCD) has been observed in antiferromagnets. The simulations of XMCD for Mn_3Sn and RuO_2 are presented, and the microscopic origin is discussed.

LSC6-06 17:05 *Invited*

Design and Fabrication of Novel Semiconductor Terahertz Photoconductive Antenna Emitter Devices at the National Institute of Physics University of the Philippines.

Elmer Surat Estacio
University of the Philippines

We will present the University of the Philippines' work on MBE-grown antenna devices for terahertz time-domain spectroscopy. We will show results on novel layer designs and exploiting terahertz surface plasmons in enhancing the antenna performance.

Oral, Friday, 26 April AM

ALPS <Room 303>

[ALPS27] 9:30-10:45
Short wavelength light sources and applications (1)
Chair: Kentaro Tomita
Hokkaido Univ.

ALPS27-01 9:30 *Invited*

Laser phase contrast imaging for the visualization of plasma fluctuations

Kenji Tanaka[1], Toshiki Kinoshita[2], Hikona Sakai[2]
[1]National Institute for Fusion Science, [2]Kyusyu University

Phase contrast imaging enables to visualize transparent object converting small phase variation into intensity variation giving quarter wavelength path difference between scattered and non-scattered laser radiation. This technique is powerful to measure plasma fluctuations.

ALPS27-02 10:00 *Invited*

New concept toward realization of attosecond FELs and its experimental demonstration

Takashi Tanaka[1], Yuichiro Kida[2], Satoshi Hashimoto[3], Shuji Miyamoto[3,5], Tadashi Togashi[2,1], Hiromitsu Tomizawa[2,1], Aoi Gocho[4], Keisuke Kaneshima[4], Yoshihito Tanaka[4,1]
[1]RIKEN SPring-8 Center, [2]Japan Synchrotron Radiation Research Institute, [3]Laboratory of Advanced Science and Technology for Industry, University of Hyogo, [4]Department of Material Science, University of Hyogo, [5]Institute of Laser Engineering, Osaka University

A proposal has been made to break the theoretical lower limit on the pulse length in FELs by means of "chirped microbunching". We experimentally demonstrated its fundamental mechanism in the NEWSUBARU storage ring.

ALPS <Room 511+512>

[ALPS30] 10:00-11:15
Novel optical devices, materials, structure and applications (1)
Chair: Takuma Aihara
NTT

ALPS30-01 10:00 *Invited*

Dispersion-engineered Metasurfaces Enabling High-sensitivity Image Sensors

Masashi Miyata
NTT Device Technology Laboratories

This talk will review pixelated metasurfaces for full-color sorting and their potential for making filter-free, high-sensitivity color image sensors.

BISC <Room 419>

[BISC8] 9:00-10:15
Session 8
Chair: Baoli Yao
National Chinese Academy of Sciences

BISC8-01 9:00 *Invited*

Approaches for Compact and High-Throughput Fourier Ptychography

Kyungchul Lee, Kyungwon Lee, Hyesuk Chae, Hansol Yoon, Seung Ah Lee
Yonsei University, Korea

Approaches for Compact and High-Throughput Fourier Ptychography.

BISC8-02 9:30

Ultrafast Time-Resolved Spectroscopy through a Thin Scattering Medium by Wavefront Shaping

Kaoru Ohta
Kobe University

We implement a proof-in-principle experiment for time-resolved pump-probe spectroscopy through a thin scattering medium. In this method, only pump pulse is focused into a target position and speckle pattern is used as a probe pulse.

BISC8-03 9:45

Adjusting the Density of the Medium to Improve Refocusing in Biomedical Applications

Yu-Yun Lu, Pei-Jie Chen, Snow H Tseng
National Taiwan University

Optical phase conjugation (OPC) holds the potential to counteract optical distortion caused by scattering effects in nonhomogeneous media. We find that a low-density medium enhances refocusing, and when the OPC span is exceeds 90 degrees, it approaches perfect refocusing.

BISC8-04 10:00

Fluorescence Imaging of Tobacco Cultured Cells through Scattering Medium using Transport of Intensity Equation and Object Domain Phase Retrieval

Shiori Matsuda[1,2], Naru Yoneda[1,3], Manoj Kumar[1,3], Osamu Matoba[1,3]
[1]Graduate School of System Informatics, Kobe Univ., [2]Japan Society for the Promotion of Science, [3]Center of Optical Scattering Image Science, Kobe Univ.

We have applied the fluorescence imaging technique using transport of intensity equation and phase retrieval in object space to biological samples with a scattering medium. In the experiments, we measured tobacco culture cells through a weak diffuser.

----- Coffee Break 10:15-10:45 -----

HEDS <Room 311+312>

[HEDS11] 9:00-10:15
Collisionless Shock 4
Chair: Frederico Fiúza
IST

HEDS11-01 9:00 *Invited*

Electron heating in high Alfvén Mach number collisionless shocks

Arno Vanthieghem[1,2,3], Vassilis Tsiolis[2], Anatoly Spitkovsky[2], Yasushi Todo[4], Kazuhiro Sekiguchi[3], Frederico Fiuza[5,6]
[1]Sorbonne Université, Observatoire de Paris, [2]Department of Astrophysical Sciences, Princeton University, [3]Department of Astro-fusion Plasma Physics (AFP), National Institute of Natural Sciences, [4]National Institute for Fusion Science, National Institutes of Natural Sciences, [5]Instituto Superior Técnico, Universidade de Lisboa, [6]High Energy Density Science Division, SLAC National Accelerator Laboratory

High Alfvén Mach numbers shocks shape the emission in many astrophysical and laboratory environments. The downstream temperature ratio between electrons and ions constitutes one of the most fundamental challenges in their modeling. I will introduce a new theoretical model that accounts for electron heating in an ambipolar-type diffusive process and discuss implications for electron injection.

HEDS11-02 9:25 *Invited*

Particle Acceleration Upstream of Relativistic Collisionless Shocks

Masanori Iwamoto[1], Takanobu Amano[2], Yosuke Matsumoto[3], Shuichi Matsukiyo[4], Masahiro Hoshino[2]
[1]Kyoto University, [2]The University of Tokyo, [3]Chiba University, [4]Kyushu University

Particle acceleration at relativistic collisionless shocks is studied by particle-in-cell simulations. We demonstrate that efficient particle acceleration occurs in the upstream and that nonthermal ions and electrons are generated. We discuss the detailed acceleration mechanism and estimate the maximum attainable energy.

HEDS11-03 9:50 *Invited*

Shocks and energetic particles in weakly collisional plasmas

Andrea Ciardi[1,2,5], Thershi Seebaruth[1,2,3,5,6,7], Anna Grassi[1,3,6], Roch Smets[1,3,7], Bruno Albertazzi[3,4,6]
[1]Sorbonne University, [2]Observatoire de Paris, [3]Ecole Polytechnique, [4]CNRS, [5]LERMA, [6]LULI, [7]LPP

Plasma shocks are ubiquitous in astrophysical and laboratory settings, yet their structure and microphysics remain poorly understood, particularly in the weakly collisional regime. We report on modelling and experiments that probe laser-produced shocks across a wide range of collisionality. The results provide insights into the plasma dynamics, suprathermal ion populations and microinstabilities.

----- Coffee Break 10:15-10:35 -----

Oral, Friday, 26 April AM

IP <Room 414+415>

[IP7] 9:00-10:15
Holography 1
Chair: Naru Yoneda
Kobe University

IP7-01 9:00 *Invited*

Numerical models for ultrafast diffraction in light-in-flight holography
David Blinder[1,2,3], Takashi Kakue[3]
[1]Vrije Universiteit Brussel, [2]imec, [3]Chiba University
Light-in-flight (LIF) holography is an ultrafast imaging technique for single-shot simultaneous 3D and femtosecond time resolution acquisitions of light pulse propagation. However, the algorithms to model diffraction over short timescales are currently limited in scope, accuracy, and efficiency. We propose and validate computer-generated algorithm extensions for short-time scales.

IP7-02 9:30

Multiscale profile measurement by using multi-wavelength FMCW-digital holography
Hikaru Hamada, Varun Kumar, Masayuki Yokota
Shimane University
We proposed multiwavelength digital holography using the hologram multiplexing in time-frequency domain based on FMCW technique. Three holograms recorded with different wavelengths were multiplexed, and the multiwavelength unwrapping was applied to measure the step object.

IP7-03 9:45

Detection of defects in the solar battery film using both digital holography and lock-in thermography
Varun Kumar, Masayuki Yokota,
Taisei Kishikawa, Yusuke Wakabayashi
Shimane University Japan
Artificially fabricated defects in a commercial solar battery film have been detected using combined method of digital holographic interferometry and lock-in thermography technique. The technique can be applied to electrical devices for their health monitoring.

IP7-04 10:00

The recent progress in holographic data storage technology
Xiao Lin, Jianying Hao, Yongkun Lin,
Hongjie Liu, Ruixian Chen, Shenghui Ke,
Rongquan Fan, Xiaoqing Zheng, Jie Zheng,
Jing Xu, Dakui Lin, Kun Wang, Xiaodi Tan
Fujian Normal University
We proposed a multi-modulated HDS solution employing the amplitude, phase and polarization at once. Based on principle of polarized holography, 2-channel polarized multiplexing can be realized. Combined with deep learning, a lensless near field diffraction intensity model can be used to demodulate four-level amplitude and four-level phase at the same time. Compared with traditional HDS, the multi-modulated HDS can increase the storage density by about 10 times.

----- Coffee Break 10:15-10:30 -----

LDC <Room 301>

[LDC11] 9:00-9:30
AI and DX analysis for Smart Systems
Chairs: Eiji Hase
Tokushima University
Sunao Kurimura
National Inst. for Materials Science

LDC11-01 9:00 *Invited*

The effect of the online collaboration method in social presence: reevaluating interaction through SpatialChat and AI integration
Daniil Chepenko
SpatialChat Ltd.
In the digital communication landscape, online collaboration has become a pivotal aspect of our interconnected world. The presentation synthesizes empirical research and theoretical frameworks to analyze the impact of communication tools and interaction modalities on social presence. Provide practical implications for educators, and the academic community to enhance online experiences.

[LDC12] 9:30-10:30
Imaging / Lighting 2
Chairs: Yasuaki Kumamoto
Osaka University
Sunao Kurimura
National Inst. for Materials Science

LDC12-01 9:30 *Invited*

Super-resolution microscopy for volumetric samples using nonlinear fluorescence responses via stepwise excitation
Kenta Temma[1,2]
[1]Dept. of Applied physics, Osaka university, [2]Dept. of Neurosurgery, Graduate school of Medicine, Osaka University
Super-resolution microscopy surpassed the classical diffraction limit of optical microscopy. However, most of the techniques endure their ability only near the surface of the samples. We developed super-resolution techniques using nonlinear fluorescence responses that localize within the focus and suppress background signals, allowing the observation of internal structures ranging from a single cell to cell clusters.

LDC12-02 10:00 *Invited*

Mid-infrared chemical imaging using mid-infrared and visible lasers for biochemical analysis
Ryo Kato[1,2]
[1]Tokushima Univ., [2]RIKEN
In this talk, I will introduce our recent work on chemical characterization of polymeric materials and biological samples using mid-infrared photothermal (MIP) microscopy, which is a cutting-edge super-resolution all optical infrared imaging technique.

LSC <Room 421>

[LSC7] 9:00-10:15
New materials, techniques, and theory (2)
Chair: Yuta Ishii
Tohoku University

LSC7-01 9:00 *Invited*

Comprehensive Study on Pyrosilicate Scintillators with Synchrotron Beam
Shunsuke Kurosawa[1,2]
[1]Tohoku Universit, [2]Osaka University
The optical properties for Ce:$(La, Gd)_2Si_2O_7$ scintillation materials using a Synchrotron Beam at the Ultra Violet Synchrotron Orbital Radiation (UVSOR) facility were investigated, and I show its cystak growth and emission mechanism.

LSC7-02 9:20 *Invited*

Soft X-Ray High Harmonic Generation Using a High-Repetition-Rate, Intense, Few-Cycle Long-Wavelength Light Source
Nobuhisa Ishii[1,2], Momoko Maruyama[1],
Ryuji Itakura[1]
[1]National Institutes for Quantum Science and Technology, [2]Japan Science and Technology Agency
We demonstrate an intense, few-cycle light source at 2000 nm using a high-power Yb:YAG thin-disk laser. The light source is applied to high harmonic generation from argon reaching the carbon K edge at 280 eV.

LSC7-03 9:40 *Invited*

Ultrafast time-resolved electron diffraction measurements revealing energy transfer at the interface of one-dimensional heterostructures
Masaki Hada
University of Tsukuba
The presentation shows the recent combined investigation of ultrafast time-resolved electron diffraction measurements, ultrafast transient absorption measurements, and first-principles calculations on a one-dimensional van der Waals heterostructure of carbon nanotubes and boron nitride nanotubes.

LSC7-04 10:00

Dynamics of carrier relaxation in a one-dimensional system
Godai Noyama[1], Yui Iwasaki[1], Shota Ono[2],
Yuri Saida[1], Yusuke Arashida[1],
Thomas Gauither[3], Nicolas Godin[3],
Gaël Privault[3], Hiroo Suzuki[4],
Yasuhiko Hayashi[4], Roman Bertoni[3],
Masaki Hada[1]
[1]Univ. Tsukuba, [2]Tohoku Univ., [3]Univ Rennes, [4]Okayama Univ.
This study demonstrated the decay constants of photoexcited carriers as a function of probe energy in a representative one-dimensional material, carbon nanotubes, using broadband and ultrafast transient absorption spectroscopy and theoretical calculations.

----- Coffee Break 10:15-10:35 -----

LSSE <Room 316>

[LSSE12] 9:30-10:30
Space Technology 5
Chairs: Katsushi Fujii
RIKEN
Norihito Saito
RIKEN

LSSE12-01 9:30 *Invited*

Recent trends of space laser communications and the future for Beyond 5G/6G
Morio Toyoshima
National Institute of Information and Communications Technology
Space laser communications have potentially wider bandwidths, smaller equipment and lower power consumption for satellite communications. This paper introduces the trends and future of the space laser communications for the beyond 5G and 6G era.

LSSE12-02 10:00 *Invited*

First application of laser melting method to ice core sampling to study climate change
Yuko Motizuki[1], Yoichi Nakai[1],
Kazuya Takahashi[1], Junya Hirose[1],
Yu Vin Sahoo[1], Masaki Yumoto[2,3],
Masayuki Maruyama[2], Michio Sakashita[2],
Kiwamu Kase[2], Satoshi Wada[2],
Hideaki Motoyama[4], Yasushige Yano[1]
[1]Astro-Glaciology Laboratory, RIKEN Nishina Center, [2]Photonics Control Technology Team, RIKEN Center for Advanced Photonics, [3]Innovative Laser Processing Group, National Institute of Advanced Industrial Science and Technology, [4]National Institute of Polar Research
We developed a novel Laser Melting Sampler (LMS) for ice cores to measure the stable water isotope ratios (δ18O and δD) as temperature proxies of the past. A segment of an Antarctic ice core, using the LMS, was demonstrated to have been discretely sampled with a depth resolution as small as 3 mm. In this talk, we will deliver the key and merit of using laser melting in ice core science. Reference: Motizuki Y, et al. *Journal of Glaciology*. 2023:1-7. doi:10.1017/jog.2023.52

Oral, Friday, 26 April AM

OMC <Room 418>

[OMC12] 9:00-10:15
Session 10
Chairs: Halina Rubinsztein-Dunlop
University of Queensland
Alexander Govorov
Ohio University

OMC12-01 9:00 ***Invited***

Towards qudit quantum information processing on-chip using transverse modes
Mary Jacquiline Romero[1,3], Daniel Peace[1,3], Jamika Roque[2]
[1]University of Queensland, [2]University of the Philippines, [3]ARC Centre of Excellence for Engineered Quantum Systems
The transverse mode of photons in a waveguide is one under-explored property that can help towards scaling up integrated photonic devices. We show how inverse design can help with the design of robust devices, which will help towards the realisation of a universal, programmable, qudit quantum information processing on-chip.

OMC12-02 9:30

Fano-resonant Plasmonic Metamaterials for Nanoparticles Photoluminescence Enhancement
German Suslin, Giang Viet Truong, Hao Zhao, Akimitsu Narita, Sile Nic Chormaic
Okinawa Institute of Science and Technology Graduate University
We demonstrate that the photoluminescence, emitted from nanoparticles in water solution, can be greatly enhanced by coupling to the plasmonic cavity mode using plasmonic metamaterial tweezers at Fano resonant frequency.

OMC12-03 9:45

Automated preparation of holographic data storage materials.
Rupeng Yang, Shaodong Zhang, Junhui Wu, Yiping Liu, Linlin Fan, Junchao Jin, Yongkun Lin, Xiao Lin, Xiaodi Tan
Fujian Normal University
In the past, the recording materials used for holographic data storage—PQ/PMMA—were manually prepared. However, manually prepared materials were not very stable in performance and contained many bubbles. Therefore, we decided to adopt an automated approach to produce the materials used for holographic data storage.

OMC12-04 10:00

Metasurface assisted Abrupt Autofocusing for Laser treatment applications
Surag Athippillil Suresh[1], Bo-Wei Huang[2], Sunil Vyas[2], Cheng Hung Chu[2], Yuan Luo[2], Kuang-Yuh Huang[2], Pan-Chyr Yang[2], J. Andrew Yeh[1], Din Ping Tsai[3,4]
[1]National Tsing Hua University, [2]National Taiwan University, [3]Academia Sinica, [4]City University of Hong Kong
This research investigates the use of metasurface optics for precise control of optical energies in biomedical based laser applications.It demonstrates the generation of an abrupt autofocusing beam (AAF) through a nanophotonic metasurface, which enables selective delivery of optical energy to specific regions of interest which is useful for various biomedical applications.

OWPT <Room 304>

[OWPT9] 9:30-10:30
Session 9
Chair: Motoharu Matsuura
Univ. Electro-Communications

OWPT9-01 9:30 ***Invited***

PoF-based Wireless and Optical Convergent Access Towards 6G
Arismar Cerqueira Sodré Junior[1,2], Leticia C Souza[1]
[1]National Institute of Telecommunications (Inatel), [2]Instituto Brasília de Tecnologia e Inovação (IBTI)
Power over Fiber (PoF) technology has been considered potential for diverse applications, including avionics, telecommunications, Industrial Internet of Things and smart power management. This Invited Paper is focused on its use in 5G optical/wireless networks towards 6G applications.

OWPT9-02 10:00

Optically Powered Hybrid 5G System Integrating A-RoF/FSO/VLC Technologies
Letícia Carneiro de Souza[1], Tomás Powell Villena Andrade[1], Felipe Batista Faro Pinto[1], Luis Gustavo Silva[2], Francisco Martins Portelinha Junior[2], Rodnei Carçola[3], Evandro Lee Anderson[3], Arismar Cerqueira Sodré Junior[1]
[1]Laboratory WOCA, National Institute of Telecommunications, Inatel, [2]Inatel Competence Center (ICC), National Institute of Telecommunications, Inatel, [3]MPTCable
We report the implementation of an innovative hybrid 5G system integrating analog radio-over-fiber (A-RoF), free-space optics (FSO), and visible light communications (VLC) technologies within the C-RAN architecture. Power-over-fiber (PoF) technology plays a key role in successfully powering a VLC LED and electrical amplifier.

TILA-LIC <Room 315>

[TILA-LIC8] 9:00-10:30
Bonding Technology & ATLA Project - 3
Chair: Hideki Ishizuki
RIKEN SPring-8 Center, Sayo-gun, Japan

TILA-LIC8-01 9:00 ***Invited***

Surface Activated Bonding for 3D and Heterogenous Integration at Room Temperature
Tadatomo Suga
Meisei University
The current status and future challenges of surface-activated bonding, a low-temperature bonding technology for 3D and heterogeneous integration, will be reviewed. It is expected to contribute to the three-dimensional integration as well as to solving heat dissipation problems in photonic and high-power devices.

TILA-LIC8-02 9:30

DFC PowerChip optical properties for J-class amplifier system
Arvydas Kausas[1,2], Akihiro Osanai[1], Vincent Yahia[2,1], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science
We measured bulk laser induced damage threshold values for various sapphire and Nd:YAG crystals grown by different manufacturers. The connection between color center absorption and low damage threshold value in sapphire is considered to be the main source of lower damage threshold value.

TILA-LIC8-03 9:45

Plasmon and Electronic-Resonance-Free Coherent Raman Spectroscopy Sensitive to Ultra-Thin Interfacial Layers
Toshiki Sugimoto[1,2]
[1]Institute for Molecular Science (IMS), [2]RIKEN SPring-8 Center (RSC)
We demonstrate all-optical enhanced highly sensitive Raman spectroscopy that can be versatilely applicable to surface/interfacial ultrathin layers of optical materials without signal enhancements by plasmonic nanostructures and specific electronic resonances. Such spectroscopic innovation was achieved by three-colour coherent anti-Stokes Raman scattering that hybridizes time- and frequency-domain spectroscopic schemes.

TILA-LIC8-04 10:00

Effective thermal conductivity of DFC gain media
Yoichi Sato[1,2], Kausas Arvydas[1,2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science
We confirmed the thermal resistance between bonded surfaces of the distributed face-cooled (DFC) gain media, which were made of Nd:YAG and sapphire. It indicates that the surface activated bonding technology enables us to enhance the 10 W/mK of the YAG thermal conductivity over 27 W/mK effectively.

NOTE

Oral, Friday, 26 April AM

ALPS <Room 303>

ALPS27-03 10:30

Coherent super-continuum soft x-ray generation by a TW-class single-cycle laser

Kaito Nishimiya[1,2], Dai Ikeda[1,2], Rambabu Rajpoot[1], Eiji J Takahashi[1,2]
[1]*Ultrafast Coherent Soft X-ray Photonics Research Team, RIKEN Center for Advanced Photonics, RIKEN,* [2]*Extreme Laser Science Laboratory, RIKEN Cluster for Pioneering Research, RIKEN*

We demonstrate carrier-envelope phase-dependent high-order harmonic generation with over one-octave continuum soft x-ray bandwidth using single-cycle optical pulses at the mid-IR region.

----- Coffee Break 10:45-11:00 -----

[ALPS28] 11:00-12:00
Short wavelength light sources and applications (2)
Chair: Takeshi Higashiguchi
Utsunomiya Univ.

ALPS28-01 11:00 ***Invited***

Next generation ultrafast laser for attosecond science

Eiji J. Takahashi
RIKEN

A new form of optical parametric amplification with two different nonlinear crystals can generate a multi-TW carrier-to-envelope phase-stable single-cycle laser pulse in the mid-infrared region.

ALPS28-02 11:30 ***Invited***

Soft X-Ray Laser Ablation Toward to Nanometer-Scale Depth Surface Patterning

Masahiko Ishino
National Institutes for Quantum Science and Technology (QST)

Damage thresholds and structures on various materials induced by the soft x-ray free electron laser irradiations were evaluated. On the sapphire crystal surface, we found a novel processing structure having extremely shallow nanometer depth.

ALPS <Room 511+512>

ALPS30-02 10:30

Varifocal Meta-devices for Bio-imaging and Future 6G Communication

Mu Ku Chen[1,2], Xiaoyuan Liu[1,2], Jingcheng Zhang[1], Yin Zhou[1], Jialuo Cheng[1], Takuo Tanaka[3], Din Ping Tsai[1,2]
[1]*City University of Hong Kong,* [2]*The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong,* [3]*RIKEN Center for Advanced Photonics*

Meta-device is a new type of flat optical device composed of artificial nanostructures that can manipulate the incident electromagnetic wave's phase, polarization, and amplitude. We developed varifocal meta-lenses to manipulate the focusing spot in 1D for bioimaging in 2D and 3D for 6G communication.

ALPS30-03 10:45

3D metasurface holograms of SiN for multicolor projection

Tamaki Onozawa, Junpei Beppu, Masakazu Yamaguchi, Kentaro Iwami
Tokyo University of Agriculture and Technology

The high 95% diffraction efficiency and 83% transmittance were achieved in 3D metasurface holograms made of SiN high-aspect-ratio nanopillars (1394 nm). It enables observation with the naked eye and the time-division-multiplexing method for multicolor projection.

ALPS30-04 11:00

Alvarez Metalens with Polarization Separation Function

Mitsutoshi Hada[1], Hyo Adegawa[1], Katsuma Aoki[1], Satoshi Ikezawa[2], Kentaro Iwami[1]
[1]*Tokyo University of Agriculture and Technology,* [2]*Waseda University*

We developed a varifocal metalens with polarization separation function of up to 17.8 dB and confirmed that its focal length can be varied in the range of 0.75 to 11.85 mm.

----- Lunch 11:15-13:15 -----

BISC <Room 419>

[BISC9] 10:45-12:00
Session 9
Chair: Wataru Inami
Shizuoka University

BISC9-01 10:45

Two-channel holography to reconstruct the scattered Stokes vector

Sourav Chandra, Rakesh Kumar Singh
IIT BHU (Varansi)

Coherent light propagating through scattering media generates laser speckles, obscuring polarization states of incident light. This paper introduces a new holography technique to evaluate Generalized Stokes parameters, subsequently extracting polarization states of the incident beam.

BISC9-02 11:00

Common-path digital holographic microscope employing a volume holographic grating

Chen-Ming Tsai[1], Yuan Luo[1,2,3]
[1]*Institute of Medical Device and Imaging, National Taiwan University, Taipei, 10051, Taiwan, R.O.C,* [2]*Graduate School of Advanced Technology, National Taiwan University, Taipei, 10672, Taiwan, R. O. C,* [3]*Yong-Lin Institute of Health, National Taiwan University, Taipei, 10087, Taiwan, R. O. C*

We proposed the common-path digital holographic microscope based on volume holographic grating (VHG). With VHG's unique diffraction characteristics, only a single diffraction order is generated with high efficiency and able to improve system power usage.

BISC9-03 11:15

3D fluorescence imaging by LC crystal lens-based single-shot incoherent digital holographic microscope

Manoj Kumar, Masaya Nishimura, Naru Yoneda, Osamu Matoba
Kobe University, Japan

A liquid crystal lens-based single-shot and common-path framework of an incoherent digital holographic microscope is proposed to experimentally show the 3D fluorescence imaging of fluorescent beads and biological cells.

BISC9-04 11:30 ***Invited***

DMD-SIM for Super-Resolution and Optical Sectioning Microscopy

Baoli Yao, Dan Dan, Jia Qian, Wang Ma, Chen Bai, Xianghua Yu, Xing Li, Rui Ma
Chinese Academy of Sciences

Structured illumination microscopy (SIM) can perform both super-resolution and three-dimensional (3D) optical sectioning imaging, attracting continuous attentions of biomedical and optical communities. SIM inherits the wide-field configuration of optical microscopes by replacing the Köhler illumination with a structured illumination module.

HEDS <Room 311+312>

[HEDS12] 10:35-11:45
Collisionless Shock 5
Chair: Andrea Ciardi
LERMA - Observatoire de Paris

HEDS12-01 10:35 ***Invited***

PeV Cosmic Ray Acceleration in the Supernova Blast Wave: Kinetic-magnetohydrodynamic Simulations

Tsuyoshi Inoue
Konan University

Supernova remnants are believed to be the accelerators of cosmic-rays up to PeV. In this work, using a novel method developed by Inoue (2009), we show that cosmic-ray streaming instability mediated acceleration successfully energize cosmic-rays more than PeV at the supernova shock propagating in the dense circum stellar medium.

HEDS12-02 11:00

Particle acceleration by a relativistic shock propagating into an inhomogeneous medium

Kanji Morikawa, Yutaka Ohira, Takumi Ohmura
The University of Tokho

Although a relativistic shock cannot accelerate particles efficiently, we found that the interaction between the shock and some upstream density fluctuations can make the downstream turbulent enough to accelerate the particles by the relativistic shock.

HEDS12-03 11:15

Relativistic collisionless shock propagating in an unmagnetized relativistically hot plasma

Kazuki Kamiido, Yutaka Ohira
The University of Tokyo

We show that the energy dissipation in collisionless shocks in a relativistically hot plasma is much larger than that for nonlelativistic cases. We present Particle-In-Cell simulation results of collisionless shocks in a relativistically hot plasma.

HEDS12-04 11:30

Relativistic particle acceleration in counter propagating Alfvén waves

Shogo Isayama[1], Shuichi Matsukiyo[1], Takayoshi Sano[2]
[1]*Kyushu University,* [2]*Osaka University*

In our recent study, through 1D simulations, it has been shown that that when the amplitude of the two counter-propagating Alfven waves exceeds critical amplitude any particles irreversibly gain relativistic energy within a short time regardless of their initial energy. In this study, we also investigate the particle acceleration process in 2D Alfven turbulence where the time evolution of parametric instability could be different from that in 1D.

Oral, Friday, 26 April AM

IP <Room 414+415>

[IP8] 10:30-12:00
Holography 2
Chairs: Xiao Lin
Fujian Normal University
Takashi Kakue
Chiba University

IP8-01 10:30 *Invited*

Polarization multiplexed holograms recorded on azo copolymer films for optical information processing

Boaz Jessie Jackin[1], Sumit Kumar Singh[2], Kenji Kinashi[3], Naoto Tsutsumi[3], Wataru Sakai[3]
[1]Materials Innovation Laboratory, Kyoto Institute of Technology, [2]Graduate School of Science and Technology, Kyoto Institute of Technology, [3]Faculty of Materials Science and Engineering, Kyoto Institute of Technology

We report azo functionalized copolymer film as a hologram recording material for high-density information recording and retrieval. A polarization-angular multiplexed method can successfully record and reconstruct 6 images on the same area of the film. Similarly, a vector-vortex beam can also be successfully reconstructed simply by illuminating a the hologram with a collimated laser.

IP8-02 11:00

Multi-view specular reflections of polygon-based holograms via bump mapping

Fan Wang[1], David Blinder[2,3,1], Tomoyoshi Ito[1], Tomoyoshi Shimobaba[1]
[1]Chiba University, [2]Vrije Universiteit Brussel, [3]IMEC

We propose a new method for multi-view specular reflection of polygon-based holograms, enabling specular reflections to change smoothly with the viewing angle. Bump mapping is used so that arbitrarily uneven terrain can be naturally illuminated without increasing the number of triangles.

IP8-03 11:15

Suppression of edge artifacts based on Zernike defocus aberration in depth-map computer-generated holography

Xiaosi Hu[1], Yusuke Saita[2], Takanori Nomura[2]
[1]Graduate School of Systems Engineering, Wakayama University, [2]Faculty of Systems Engineering, Wakayama University

Holographic 3D displays with depth-map models cause edge artifacts due to inter-layer diffraction. The accommodation mask method using Zernike defocus aberration is proposed to suppress artifacts and enhance realism in accommodation effects.

IP8-04 11:30

Orthogonal Recording and Reconstruction of Linear Polarization States Via Photorefractive Volume Holography

Aviel Sheen Villacorta Dumaicos[1], Raphael A. Guerrero[2]
[1]Philippine Science High School - Caraga Region Campus, [2]Ateneo de Manila University

This study investigates the use of lithium niobate in volume holography with recording beams having perpendicular polarization states. Results indicate that diffraction efficiencies are polarization-dependent but do not differ significantly. An existing theoretical framework effectively captures the experimental results of the study.

LDC <Room 301>

----- Coffee Break 10:30-11:00 -----

[LDC13] 11:00-12:00
Imaging / Lighting 3
Chairs: Muneharu Kuwata
Mitsubishi Electric Corp.
Norihiro Ohse
Sony Corp.

LDC13-01 11:00 *Invited*

High-contrast Raman imaging using temporal filtering

Terumasa Ito
Tokyo University of Agriculture and Technology

The signal contrast of coherent Raman microscopy is limited by background signals from tissue components. We compare and discuss the performance of current background-suppression methods, focusing on the temporal filtering response of the detection systems.

LDC13-02 11:30 *Invited*

All-pulsed two-photon STED microscopy for nanoscale tissue imaging

Hirokazu Ishii[1,2], Kohei Otomo[3], Tomomi Nemoto[1,2]
[1]Exploratory Research Center on Life and Living Systems (ExCELLS), National Institute of Natural Sciences, [2]National Institute for Physiological Sciences (NIPS), National Institute of Natural Sciences, [3]Graduate School of Medicine, Juntendo University

We developed a two-photon excitation STED microscope utilizing laser-diode-based pulsed light sources and time-gated fluorescence detection, namely, all-pulsed 2PE-gSTED microscopy. Time-gating effectively eliminated undesired signals from brain tissue, resulting in the spatial resolution of 123.3 ± 7.1 nm for the 2PE-gSTED images, which was 1.4 times higher than that for the non-gated images.

LSC <Room 421>

[LSC8] 10:35-12:00
New materials, techniques, and theory (3)
Chair: Hiroki Wadati
University of Hyogo

LSC8-01 10:35 *Invited*

Nonthermal melting of charge density wave in 3R-$Ta_{1+x}Se_2$ induced by intense terahertz pulse excitation

Naotaka Yoshikawa
The University of Tokyo

We investigated an ultrafast dynamics of charge density wave order induced by intense terahertz pulse excitation in 3R-$Ta_{1+x}Se_2$ by the pump-probe spectroscopy, and demonstrated an efficient nonthermal melting of charge density wave.

LSC8-02 10:55 *Invited*

High Density Rydberg Gas Produced by Picosecond Laser Pulses Toward Ultrafast Quantum Simulation

Takuya Matsubara[1], Seiji Sugawa[1,2,3], Vikas Singh Chauhan[1], Vineet Bharti[1], Arnab Maity[1,4], Tirumalasetty Panduranga Mahesh[1,2], Takafumi Tomita[1,2], Sylvain de Léséleuc[1,2], Kenji Ohmori[1,2]
[1]Institute for Molecular Science, National Institutes of Natural Sciences, [2]SOKENDAI (The Graduate University for Advanced Studies), [3]Department of Basic Science, The University of Tokyo, [4]Indian Institute of Science Education and Research Kolkata

We generated a high-density Rydberg gas of ultracold ^{87}Rb atoms by ultrafast excitation using an improved picosecond pulse laser system, toward ultrafast quantum simulation of spin-motion system grounded on Rydberg crystal.

LSC8-03 11:15 *Invited*

Sum-frequency Excitation of Excitons and Phonons in van-der-Waals Semiconductor

Satoshi Kusaba
Yokohama National University

We demonstrated sum-frequency excitations of optically inactive excitons and phonons in a van-der-Waals semiconductor transition metal dichalcongenide (TMD) by irradiating broadband near- and far-infrared pulses.

LSC8-04 11:35 *Invited*

Theoretical proposal for Fourier-limited attosecond pulse generation from electrons in solids

Shohei Imai[1], Atsushi Ono[2]
[1]University of Tokyo, [2]Tohoku University

We theoretically demonstrated attosecond pulse generation in solid materials. This is achieved by synthesizing an optimal electric field waveform of light, based on electron wave packet control via dynamical electron mass sign change.

LSC-CL 11:55

Closing Remarks

Toshihiko Shimizu
Osaka University

LSSE <Room 316>

----- Coffee Break 10:30-11:00 -----

[LSSE13] 11:00-11:40
Space Technology 2
Chair: Norihito Saito
RIKEN

LSSE13-01 11:00

Modelling of Software Defined Laser for quantum technologies in space

Ho Kwan Chau[1], Chris Bridges[1], Peter Nisbet-Jones[2]
[1]Surrey Space Centre, University of Surrey, Guildford, U.K., [2]Twin Paradox Labs, London, U.K.

We propose a novel Python-based model of compact laser systems for future space-based quantum devices and finding the optimal back-end solution for low size, weight, power, and cost (SWaP-C) cold atom interferometers and atomic clocks.

LSSE13-02 11:20

Thrust measurement of EUV photoablation

Naoki Miyake[1], Kodai Nakai[1], Koichi Mori[1], Nozomi Tanaka[2], James Edward Hernandez[2]
[1]Osaka Metropolitan University, [2]Osaka University

Space debris removal by laser ablation is a promising method for removing debris smaller than 1-10 cm. In this study, thrust measurement using EUV light was performed for the first time in the world.

----- Lunch 11:40-13:00 -----

Oral, Friday, 26 April AM

OMC <Room 418>

----- Coffee Break 10:15-10:45 -----

[OMC13] 10:45-12:00
Session 11
Chairs: Min-Kyo Seo
KAIST
Ryuji Morita
Hokkaido University

OMC13-01 10:45 ***Invited***

High-Resolution Afterglow Modulation Using Efficient Persistent Room-Temperature Phosphorescence Materials
Shuzo Hirata
The University of Electro-Communications
The afterglow derived from room-temperature phosphorescence is potentially a challenge for high-resolution imaging applications without relying on surrounding autofluorescence because it enables stronger afterglow brightness compared with common afterglow emitters using charge separation and recombination [1,2,3].

OMC13-02 11:15

Fabrication of double spiral structure using plasmonic-nanoparticle-assisted photochemical reaction
Hyo-Yong Ahn, Hiromi Okamoto
Institute for Molecular Science
We developed a method to provide a novel double spiral structure using a photochemical reaction based on the interaction of plasmonic Au@Ag cuboid nanoparticles and circularly polarized light. The interaction of the incident laser beam with the achiral nanoparticle produced a spiral shape of the interference pattern which is replicated via photopolymerization process.

OMC13-03 11:30

Triple-channel recording of polarization holography using orthogonal polarization arrays
Xianmiao Xu, Shenghui Ke, Shujun Zheng, Yi Yang, Xiaodi Tan
Fujian Normal University
We present a novel polarization encoding method for high-density optical data storage in volume polarization-sensitive materials. Using accurate orthogonal polarization array codes in a reference-based multiplexing technique, the polarization holograms can be efficiently and independently reconstructed separately by orthogonal polarization array codes.

OMC13-04 11:45

Optical force mapping of a single pentacene molecule measured by photoinduced force microscopy (PiFM)
Yasuhiro Sugawara, Tatsuya Yamamoto, YanJun Li
Osaka University
We demonstrate optical mapping of a single molecule with a spatial resolution of less than 0.6 nm using photoinduced force microscopy, successfully resolving the optical response inside a single molecule.

OWPT <Room 304>

OWPT9-03 10:15

Scaling Requirements for Eye-Safe Optical Wireless Power Transmission
Dominic Andrew Duffy[1,2], Stephen John Sweeney[1,2]
[1]University of Glasgow, [2]ZiNIR Ltd.
We discuss the challenges and requirements for high power free space OWPT systems operating at eye-safe wavelengths. Key factors influencing system configuration and how these constrain the photovoltaic laser power converter design are considered.

----- Coffee Break 10:30-11:00 -----

[OWPT10] 11:00-12:00
Session 10
Chair: Kayo Ogawa
Japan Women's Univ.

OWPT10-01 11:00

Performance Evaluation of Optically Powered High-Power Photo Diodes
Yuki Gomi, Souya Sugiura, Mizuki Fukuyama, Kai Murakami, Motoharu Matsuura
University of Electro-Communications
We present an optically powered high-power photo-diode, which enables to introduce optically powered remote antenna units without electrical power amplifiers. In this study, we evaluate the RF output power of the optically powered high-power photo-diode, and show the high quality of converted electrical data signals with the RF output power of more than 10 dBm.

OWPT10-02 11:15

Continuous driving of small mobility vehicles with dynamic charging by optical wireless power transmission on a course including non-irradiation sections
Yusuke Suda, Mahiro Kawakami, Tomoyuki Miyamoto
Tokyo Institute of Technology
Electric vehicles are becoming popular, however there are problems with the power supply related to the battery. The effects of light irradiation section ratio and improvement of light utilization efficiency were investigated numerically and experimentally for a small toy vehicle model.

OWPT10-03 11:30

Improving Efficiency Factors for Laser Power Beaming
Tom Nugent, Jr., Jonathon Gort, Drew Cardwell
PowerLight Technologies
We analyze losses in various components of a typical laser-power beaming system, compare them with theoretical limits, and present a path to 30% wall-plug efficiency, along with justification for believing the goal is achievable.

OWPT-CL 11:45

Award Ceremony
Closing Remarks
Kensuke Ikeda[1], Masakazu Arai[2]
[1]CRIEPI, [2]Univ. of Miyazaki

TILA-LIC <Room 315>

TILA-LIC8-05 10:15

Temperature distribution simulations in Cr:LiSAF DFC chip for high power broadband tiny integrated laser in 800-950 nm range
Florent Cassouret[1], Takunori Taira[1,2]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 center
Thermal distribution calculation on new designed Cr:LiSAF DFC chip shows 4 times lower temperature compared to bulk crystal under 100W-diode pumping which could lead to over 40W output power.

----- Coffee Break 10:30-11:00 -----

[TILA-LIC9] 11:00-12:00
Laser Systems & ATLA Project - 4
Chair: Rakesh Bhandari
Optoquest Co. Ltd., Saitama, Japan

TILA-LIC9-01 11:00 ***Invited***

Development of in high energy DPSSL amplifier technology at the CLF and demonstration of stable, long-term operation of a DPSSL operating at 10 J, 100 Hz
Mariastefania De Vido[1], Gary Quinn[1], Danielle Clarke[1], Luke McHugh[1], Paul Mason[1], Jacob Spear[1], Jodie Smith[1], Martin Divoky[2], Jan Pilar[2], Ondrej Denk[2], Thomas Butcher[1], Chris Edwards[1], Tomas Mocek[2], John Collier[1]
[1]STFC Rutherford Appleton Laboratory, UK, [2]HiLASE Centre, Czech Republic
We summarise recent developments in high energy diode-pumped solid-state laser (DPSSL) technology at the STFC Central Laser Facility. These include the first ever demonstration of long-term, reliable amplification in a kW-class high energy nanosecond pulsed DPSSL at 100 Hz. We then provide an overview of future exploitation of this technology.

TILA-LIC9-02 11:30

Coherent stacking 128 ultrashort pulses to tens of mJ from fiber amplifiers
Yun Feng Wu[1,2], Bo Wei Yang[1,3], Ruo Ao Yang[1], Yan Rong Song[2], Zhi Gang Zhang[1]
[1]Peking University, [2]Beijing University of Technology, [3]University of Michigan
We report a coherent combination system that stackes 128 femtosecond pulses from fiber amplifiers. The stacked pulse energy is >10 mJ and the pulse width is 256 fs. The current combination system has a potential to generate tens of mJ pulses.

TILA-LIC9-03 11:45

0.3 PW/(sr cm^2) brightness unstable resonator microchip laser for multi-point ignition
Hwan Hong Lim[1], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center
A passively cooled Nd:YAG/Cr^{4+}:YAG microchip laser sets a brightness record of 300 TW/(sr cm^2) with 26.4 MW peak power (10.5 mJ, 398 ps) and M^2 of 2.7 at 10 Hz. This enables a 150 mm focusing and 7-point air-breakdown, while 100 Hz operation is demonstrated without active cooling using a DFC-chip.

NOTE

Oral, Friday, 26 April PM

ALPS <Room 303>	ALPS <Room 511+512>	BISC <Room 419>	HEDS <Room 311+312>

----- Lunch 11:45-13:15 -----

----- Lunch 12:00-13:30 -----

[ALPS29] 13:30-15:00
Short wavelength light sources and applications (3)
Chair: Keisuke Kaneshima
University of Hyogo

ALPS29-01 13:30

Ultrafast laser-driven extreme-ultraviolet sources for applications to advanced nanolithography

THANH HUNG DINH[1], Shinichi Namba[2], Hiroki Yamamoto[1], Noboru Hasegawa[1], Masahiko Ishino[1], Masaharu Nishikino[1]
[1]National Institutes for Quantum Science and Technology (QST), [2]Graduate School of Advanced Science and Engineering, Hiroshima University

We develop ultrafast laser-driven EUV sources and attempt to evaluate the response of photoresist materials exposed to intense ultrashort EUV pulses, as a touchstone for the next-generation EUV-FEL lithography.

ALPS29-02 13:45

Ptychography Phase Retrieval via Threshold Truncat ion Alternating Direction Method of Multipliers Using High Harmonic Sources

Shaobo Fang[1,2], Xianming Wu[1,2]
[1]Institute of Physics Chinese Academy of Sciences, [2]University of Chinese Academy of Science

We introduce a closed-form ADMM algorithm for robust phase retrieval in Ptychography, utilizing a threshold truncation update method for penalty parameter adjustment. Our approach outperforms others, ensuring superior phase retrieval even with a 25% overlap rate.

[ALPS31] 13:15-14:30
Novel optical devices, materials, structure and applications (2)
Chair: Koichi Okamoto
Osaka Metropolitan University

ALPS31-01 13:15 ***Invited***

Engineering Photoluminescence with Nanoantennas

Shunsuke Murai
Kyoto University

Light-scattering nano-elements are referred to as nanoantennas due to the ability to harness the light. Nanoantenna phosphors, i.e., phosphor plates combined with nanoantenna, enable spatial and spectral control over the luminescence from the phosphor. In this study, we visualize the distribution of the photoluminescence from the nanoantenna phosphor into forward, backward, and side directions by using the integrating sphere.

ALPS31-02 13:45

Optical properties and luminescence control of Ag/TiO_2 stacked metasurfaces using out-of-plane quadrupole resonance

TienYang Lo, Shunsuke Murai, Katsuhisa Tanaka
Kyoto University

In this study, we experimentally and numerically elucidated the optical properties of a bilayer metasurface system exhibiting out-of-plane quadrupole resonance characteristics and demonstrated the potential for bilayer metasurfaces system in directional light source applications.

----- Lunch 12:00-13:30 -----

[BISC10] 13:30-15:15
Session 10
Chair: Mitsuhiro Morita
Kobe University

BISC10-01 13:30 ***Invited***

Time-deterministic cryogenic optical microscopy with on-stage rapid freezing

Masahito Yamanaka
Osaka University, Japan

We developed a technique to realize rapid freezing of biological samples under optical microscopic observation. Our technique provides spatio-temporal information of sample dynamics to cryofixed samples, allowing detailed observations with high spatial resolution and quantifiability.

[HEDS13] 13:15-15:15
Magnetic Reconnection & Particle
Chair: Youichi Sakawa
Osaka University

HEDS13-01 13:15 ***Invited***

Structure of Reverse Shocks and Radiative Cooling Effects in High Energy Density Plasma Experiments

S. Merlini[1], J. D. Hare[2], G. C. Burdiak[3], J. W. D. Halliday[4], A. Ciardi[5], J. P. Chittenden[1], A. J. Crilly[1], K. Marrow[1], D. R. Russell[1], L. G. Suttle[1], E. R. Tubman[1], V. Valenzuela-Villaseca[7], T. W. O. Varnish[2], S. V. Lebedev[1]
[1]Blackett Laboratory, Imperial College London, United Kingdom, [2]Plasma Science and Fusion Center, Massachusetts Institute of Technology, USA, [3]First Light Fusion Ltd., Yarnton, Kidlington, United Kingdom, [4]Atomic and Laser Physics Group, University of Oxford, United Kingdom, [5]Sorbonne Université, Observatoire de Paris, PSL Research University, France, [6]Technische Universitaet Muenchen, Forschungs-Neutronenquelle Heinz Maier-Leibnitz, Germany, [7]Department of Astrophysical Sciences, Princeton University, USA

Accretion shocks, common in many astrophysical systems, can be significantly influenced by radiative cooling effects, resulting in instabilities and turbulence. This study investigates accretion shock experiments at the MAGPIE pulsed power facility using two different approaches. The first approach examines reverse shocks resulting from the collision of supersonic, magnetized plasma flows produced by an inverse wire array interacting with a planar conducting obstacle. The second approach involves the ablation of solid targets by X-ray radiation from a Z-pinch wire array.

HEDS13-02 13:40 ***Invited***

Laser astrophysics experiments for the investigation of plasma heating and acceleration in magnetic reconnection

Taichi Morita[1], Y. Muramoto[2], Y. Maenosono[2], S. Isayama[1], M. Edamoto[3], M. Hanano[4], Y. Kanesada[2], Y. Kuramitsu[5], S. Matsukiyo[1], G. Nakayama[2], K. Obayashi[6], K. Oshida[2], K. Sakai[7], J. Shiota[6], Y. Suzuki[4], T. Takezaki[8], S. J. Tanaka[6], K. Tomita[9], S. Yakura[6], R. Yamazaki[6], Y. Sakawa[10]
[1]Faculty of Engineering Sciences, Kyushu University, [2]Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, [3]Faculty of Science and Technology, Seikei University, [4]Graduate School of Science, Osaka University, [5]Graduate School of Engineering, Osaka University, [6]Department of Physical Sciences, Aoyama Gakuin University, [7]National Institute for Fusion Science, Japan, National Institutes for Natural Sciences, [8]Faculty of Engineering, University of Toyama, [9]Division of Quantum Science and Engineering, Hokkaido University, [10]Institute of Laser Engineering, Osaka University

We report recent results from the magnetic reconnection experiments using high-power laser system Gekko-XII at Osaka University. Ion velocity distribution shows anisotropic features, indicating plasma heating and acceleration.

Oral, Friday, 26 April PM

IP <Room 414+415>

IP8-05 11:45

Polarization-Structured Fine Pattern Generation by Computer Generated Holography

Yusuke Ogura[1], Taiki Suzaki[1], Elena Ghanem[2], Jun Tanida[1]
[1]Osaka University, [2]Bordeaux Institute of Technology

This paper presents polarization-structured fine pattern generation using a computer generated hologram and a polarization converter. Experimental results demonstrate generation of spots in a Hadamard-like arrangement and a curve pattern.

----- Lunch 12:00-13:15 -----

[IP9] 13:15-14:45
3D Imaging
Chairs: Yusuke Saita
Wakayama University
Kanami Ikeda
Oaska Metropolitan University

IP9-01 13:15 ***Invited***

Novel architectures in structured illumination microscopy: 3D imaging improvement by cleverer irradiation

Genaro Saavedra[1], Chrysanthe Preza[2]
[1]3D Imaging & Display Laboratory, Universitat de Valencia, [2]Computational Imaging Research Laboratory, The University of Memphis

We present the state-of-the-art in structured illumination microscopy (SIM), a technique that provides accurate 3D images of translucent samples by using non-uniform irradiance patterns in combination with digital post processing. We focus on a novel setup, tunable SIM, that provides shorter registration times, higher signal-to-noise ratios, and increased optical sectioning capabilities respect to classical SIM implementations.

IP9-02 13:45 ***Invited***

High-speed 3D imaging and metrology: from classical fringe projection to deep learning approaches

Chao Zuo
Nanjing University of Science and Technology

Deep learning enables single-frame, high-precision, unambiguous 3D shape reconstruction, which is expected to fill the speed “gap” between 3D imaging and 2D sensing.

LDC <Room 301>

----- Lunch 12:00-13:00 -----

[LDC14] 13:00-14:00
Imaging / Lighting 4
Chair: Satoshi Ouchi
Hitachi Corp.

LDC14-01 13:00 ***Invited***

Simultaneous multi-plane two-photon imaging and 4D optical manipulation

Keisuke Isobe[1,2], Katsumi Midorikawa[1]
[1]RIKEN Center for Advanced Photonics, [2]Kyoto University

We discuss multiphoton fluorescence microscopy for imaging of cell-cell interactions in different layers. We also present multiphoton patterned illumination for controlling neuronal activity.

LDC14-02 13:30

Speckle Reduction Performance Estimation

Fergal Shevlin
DYOPTYKA

We introduce an approach for estimating the speckle reduction performance of our technology at high frequencies, using measurements of speckle contrast made at lower frequencies.

LDC14-03 13:45

Analysis of RGB Speckle Grain Effects on Measured Color Speckle Distribution

Junichi Kinoshita, Kazuhisa Yamamoto, Kazuo Kuroda
Osaka University

Speckle grain effects on color speckle distribution were analyzed. We found that the 1D grain structure strongly affects the triangular shape of the measured color speckle distributions by analyzing the extracted peripheral color speckle data.

LSSE <Room 316>

[LSSE14] 13:00-15:00
Infrastructures
Chairs: Noboru Hasegawa
QST
Takashi Fujii
The University of Tokyo

LSSE14-01 13:00 ***Invited***

Toward an Elucidation of Human Judgment Process in Tunnel Inspection for Mechanization

Takafumi Sassa[1], Takashi Michikawa[1], Masahiro Shigeta[2], Kohei Yoshimura[1], Wataru Fujishige[3], Ryuichi Kitazawa[4], Jun Nagoya[4], Taketomo Kanaya[4], Satoshi Wada[1]
[1]RIKEN, [2]TOPCON CORPORATION, [3]ASTOM R&D, [4]WALNUT Ltd.

Visualization of a complexed judgment process of human experts during tunnel inspection through video analysis with deep learning is described. This technology would promote the mechanization of hammering inspection with lasers.

LSSE14-02 13:30 ***Invited***

Development and social implementations of laser hammering inspection for infrastructures

Noboru Hasegawa[1], Masaharu Nishikino[1], Hajime Okada[1], Shuji Kondo[1], Katsuya Sakamoto[2], Shigeru Kogure[2], Satoshi Tomoto[3], Yuki Yamada[3], Tomohiro Somekawa[4], Shinri Kurahashi[4], Hikaru Nakamura[5]
[1]QST Kansai, [2]Photon-Labo. Co., Ltd., [3]CTI Engineering Co., Ltd., [4]Institute for Laser Technology, [5]Nagoya Univercity

We are developing a laser hammering system (LHS) for inspection of concrete infrastructures such as tunnel and bridge. Social implementation and establishment of operation method using digitalized soundness data of the concrete are in progress.

OMC <Room 418>

----- Lunch 12:00-13:15 -----

[OMC14] 13:15-15:00
Session 12
Chairs: Chie Hosokawa
Osaka Metropolitan University
Martin Siler
Institute of Scientific Instruments

OMC14-01 13:15 ***Invited***

Optical Orbital Angular Momentum Enables Dynamic Spatial Control of 2D Nanomaterial Properties

Malcolm Kadodwala
University of glasgow

We present a novel method that employs optical forces and torques from light beams with OAM to control the electronic properties of 2D materials. The proof-of-principle demonstration focuses on controlling graphene conductivity in a transistor.

OMC14-02 13:45

Crystallization behavior of optical trapping-induced crystallization of ethylenediamine sulfate by focused G and LG beam

An-Chieh Cheng[1], Teruki Sugiyama[2], Keiji Sasaki[1]
[1]Hokkaido University, [2]National Yang Ming Chiao Tung University

This study investigates the crystallization behavior of ethylenediamine sulfate (EDS) induced by optical trapping-induced crystallization and comparing the effects of linear polarized Gaussian and Laguerre-Gaussian beams on EDS crystallization.

Oral, Friday, 26 April PM

TILA-LIC <Room 315>

----- Lunch 12:00-13:30 -----

[TILA-LIC10] 13:30-15:00
Laser Applications
Chair: Nicolaie Pavel
National Institute for Laser, Plasma and Radiation Physics - INFLPR, Magurele, Romania

TILA-LIC10-01 13:30 ***Invited***

TILA application in severe environments as a powerful tool for in-situ remote analysis of fuel debris in decommissioning of Fukushima Daiichi Nuclear Power Station

Ikuo Wakaida[1], Hironori Ohba[1], Katsuaki Akaoka[1], Takahiro Karino[1], Ryuzo Nakanishi[2], Kan Sakamoto[3], Yuji Ikeda[4], Takunori Taira[5]
[1]Japan Atomic Energy Agency, [2]The National Institutes for Quantum Science and Technology, [3]Nippon Nuclear Fuel Development Co., Ltd., [4]i-Lab., Inc., [5]Institute for Molecular Science

For the safe and efficient decommissioning of Fukushima Daiichi Nuclear Power Station, development of in-situ remote analysis of nuclear fuel debris under extreme high radiation environment has been indispensable. “TILA” has been developed as a laser built-in cmpact probe of Optical Fiber Coupled Laser Induced Breakdown Spectroscopy and enable ultra-long remote analysis of 100m.

NOTE

Oral, Friday, 26 April PM

ALPS <Room 303>

ALPS29-03 14:00 *Invited*

Modelling of laser-driven EUV source plasmas for nanolithography

John Sheil[1,2], Jorge Gonzalez[1,2], Stan de Lange[1,2], Oscar Versolato[1,2]
[1]Advanced Research Center for Nanolithography (ARCNL), [2]Vrije Universiteit Amsterdam

I will review our recent efforts in modeling laser-driven tin plasmas, specifically the atomic physics of EUV generation, radiation-hydrodynamic simulations of these plasmas as well as plasma expansion characterization.

ALPS29-04 14:30

Simulation of Tin Droplet Plasma Ablated by Multi-angle Pulsed Lasers

Qin Sun, Si Liu, Yanfei Hu, Huiming Qi, Xinbing Wang, Duluo Zuo
Huazhong University of Science and Technology

Based on the FLASH code, we design a numerical model to investigate the characteristics of plasma produced by pulsed lasers illuminating a tin droplet from multiple angles at the same time.

ALPS <Room 511+512>

ALPS31-03 14:00

Absorption Enhancement by Lattice Kerker Effect on Fluorescent Surface Lattice Resonance

Joshua T. Y. Tse, Shunsuke Murai, Katsuhisa Tanaka
Kyoto University

Absorption enhancement mediated by lattice Kerker effect was described by a modified coupled-mode theory. We discovered the optimal condition for near-perfect absorption as well as maximum in-coupling efficiency for photoluminescence.

ALPS31-04 14:15

Demonstration of a 1.5 μm wavelength NPN-type photonic-crystal surface-emitting laser exceeding 100 mW

Masahiro Hitaka, Kazuyoshi Hirose, Yutaka Takagi, Takahiro Sugiyama, Akio Ito, Tadataka Edamura
Hamamatsu Photonics K.K.

We propose a 1.5 μm wavelength NPN-type PCSEL structure to reduce unexpected p-dopant Zn diffusion and intervalence band absorption. The peak output power is 120 mW and the slope efficiency is 56 mW/A.

BISC <Room 419>

BISC10-02 14:00 *Invited*

Multi-photon Microscopy Enhanced by Manipulation of Excitation Laser Beam and its Application to Cellular Physiology

Tomomi Nemoto[1,2,3,4], Kohei Otomo[1,2,5], Hirokazu Ishii[1,2,3], Motosuke Tsutsumi[2]
[1]Exploratory Research Center on Life and Living Systems (ExCELLS), Nat. Inst. Nat. Sci., [2]Nat. Ins. Physiol. Sci., Nat. Inst. Nat. Sci., [3]Grad. Univ. Adv. Studies (SOKENDAI), [4]Res. Inst. Electro. Sci., Hokkaido Univ., [5]Grad. Sch. Med., Juntendo Univ.

Multi-photon excitation fluorescence microscopy is a robust technique for understanding physiological phenomena from the cellular to the tissue level.By taking advantage of novel laser light technologies, we have successfully improved fluorescent signal-to-noise ratio and temporal and spatial resolutions while observing physiological events in living cells and animals.

BISC10-03 14:30

Diagonal deconvolution for diagonally-scanned light-sheet microscopy

Tom Vettenburg, Laurynas Valantinas
University of Dundee

Airy beam light-sheet microscopy enables non-invasive imaging of large specimens with subcellular resolution. Samples larger than the working distance could be imaged by scanning them at 45° to the detection axis, though this hampers image reconstruction. We demonstrate a scalable, memory-efficient deconvolution algorithm for diagonal-scanned fluorescence light-sheet microscopy.

HEDS <Room 311+312>

HEDS13-03 14:05 *Invited*

Experimental Investigation on Magnetic Reconnection in Electron-Magnetized Plasmas with High-Power Lasers

Kentaro Sakai[1], Toseo Moritaka[1], Taichi Morita[2], Kentaro Tomita[3], Takumi Minami[4], Masato Ota[1], Shunsuke Egashira[4], Youichi Sakawa[4], Norimasa Ozaki[4], Ryosuke Kodama[4], Taichi Takezaki[5], Ryo Yamazaki[6], Shuta J. Tanaka[6], Michel Koenig[7], Bruno Albertazzi[7], Paul Mabey[7], Nigel Woolsey[8], Shuichi Matsukiyo[2], Masahiro Hoshino[9], Yasuhiro Kuramitsu[4]
[1]National Institute for Fusion Science, [2]Kyushu University, [3]Hokkaido University, [4]Osaka University, [5]University of Toyama, [6]Aoyama Gakuin University, [7]École Polytechnique, [8]University of York, [9]University of Tokyo

We performed a laser experiment on magnetic reconnection in electron-magnetized plasmas. The local velocity and magnetic field measurements show a diverging electron outflow and whistler waves, respectively, associated with electron dynamics in magnetic reconnection.

HEDS13-04 14:30

Repetitive Generation of Laser-driven Quasi-monoenergetic Multi-MeV Protons from Hydrogen Clusters

Masato Kanasaki[1], Takafumi Asai[1,8], Chihiro Inoue[1,8], Seiichiro Mochizuki[1], Takumi Minami[2,8], Kentaro Sakai[2], Kousuke Himeno[2], Tomoya Taguchi[2], Kazumasa Oda[2], Souichiro Suzuki[2], Yuki Abe[2], Hideki Kohri[3], Atsushi Tokiyasu[4], Shuta Tanaka[5], Tatiana Pikuz[6], Satoshi Kodaira[7], Akira Kon[8], Kai Huang[8], Nobuhiko Nakanii[8], Kotaro Kondo[8], Masaki Kando[8], Yuji Mashiba[8], Yasuhiro Miyasaka[8], Koichi Ogura[8], Akito Sagisaka[8], Hiromitsu Kiriyama[8], Tomoya Yamauchi[1], Yasuhiro Kuramitsu[2], Yuji Fukuda[8]
[1]Graduate School of Maritime Sciences, Kobe University, [2]Graduate school of Engineering, Osaka University, [3]Research Center for Nuclear Physics (RCNP), Osaka University, [4]Research Center for Electron Photon Science (ELPH), Tohoku University, [5]College of Science and Engineering, Aoyama Gakuin University, [6]Institute for Open and Transdisciplinary Research Initiatives, Osaka University, [7]National Institutes for Quantum Science and Technology (QST), [8]Kansai Photon Science Institute (KPSI), National Institutes for Quantum Science and Technology (QST)

In the laser-driven ion accelaration experiments using hydrogen cluster targets, we have confirmed the conditions for the acceleration of quasi-monoenergetic a few MeV protons via laser-cluster interactions.

Oral, Friday, 26 April PM

IP <Room 414+415>

IP9-03 14:15

Fluorescence Optical Sectioning Imaging System based on Moiré Metalens

Yu-Hsin Chia[1,2], Chen Ming Tsai[2], Sunil Vyas[2], Yi-You Huang[1,2,5], Yuan Luo[2,3,4], Min-Xuan Wang[2,3]
[1]Department of Biomedical Engineering, National Taiwan University, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Molecular Imaging Center, National Taiwan University, [4]YongLin Institute of Health, National Taiwan University, [5]Department of Biomedical Engineering, National Taiwan University Hospital

We present a Moiré metalens with long axial scanning imaging system, which utilizes the telecentric design to obtain constant magnification images with long axial scanning range. The Moiré metalens consists of two complementary phase metasurfaces. Furthermore, the imaging system incorporate with structured illumination to capture the HiLo optical sectioning images.

IP9-04 14:30

Position and Posture Estimation of Moving Object with a ColorGradient Marker by Using a Depth Camera

Shouta Hasui[1], Daisuke Barada[1,2]
[1]Graduate School of Regional Development and Creativity, Utsunomiya University, [2]Center for Optical Research and Education (CORE), Utsunomiya University

In this study, the position and posture of a moving object with a color-gradient marker was estimated by using a depth camera. Position is measured by triangulation method. The depth image was separated by multiple regions and the tilt of each region was obtained by plane fitting. The shape of marker was compensated by considering the tilt. The in-plane direction was estimated from the colorgradient direction although the image of moving marker pattern was blurred.

LDC <Room 301>

----- Coffee Break 14:00-14:15 -----

[LDC15] 14:15-15:00
Laser Applications for Moving Platforms
Chair: Junichi Kinoshita
Osaka Univ.

LDC15-01 14:15 *Invited*

FMCW LiDAR system analysis - modeling & experiment

Christoph Peter Josef Schmid, Simon Lankes, Reiner Windisch, Dominik Peller, Michael Koller, Georg Rossbach
ams-OSRAM International GmbH

FMCW-based ranging has been introduced as a disruptive new technology for automotive LiDAR. The coherent detection scheme, however, imposes strict constraints on the system design, rising the need for a quantitative system analysis.

LSSE <Room 316>

LSSE14-03 14:00 *Invited*

Evaluation of damage level of concrete delamination or internal defects using wave energy of impactelastic waves observed by the laser remote sensing system

Satoshi Tomoto[1], Hikaru Nakamura[3], Hikaru Matsunaga[1], Noboru Hasegawa[2], Yuki Yamada[1], Tateyuki Yamane[1]
[1]CTI Engineering Co., Ltd., [2]National Institutes for Quantum Science and Technology, [3]Nagoya Univercity

The purpose of this study is to evaluate the damage level of concrete delamination or internal defects using a concrete surface vibration waveform of the laser hammering system (LHS). By referring the laboratory test data, it was succeeded to evaluate the damage level by the method of evaluating attenuation graphs using a normalized wave energy curve.

LSSE14-04 14:30

Laser Shock Wave Conduit in Nondestructive Testing

Kento Kuwata[1], Masaharu Nishikino[2], Noboru Hasegawa[2], Naoki Hosoya[1]
[1]Shibaura Institute of Technology, [2]Kansai Institute for Photon Science, National Institutes for Quantum Science and Technology

The laser shock wave have the potential to noise and ablate target in vibration tests. This study controlled the non-destructive and non-contact excitation by laser shock wave using a conduit system and detected concrete defect.

OMC <Room 418>

OMC14-03 14:00

Optical trapping of flow tracers for the characterization of thermo-osmotic slip flows around charged microparticles

Tetsuro Tsuji, Satoshi Mei, Satoshi Taguchi
Kyoto University

Tracer nanoparticles for the visualization of microflow are sometimes scarce in a test section, especially when the test section is small, e.g., a close vicinity of a solid surface. In this study, the optical trapping of the tracers is applied to facilitate the visualization of thermo-osmotic slip flow in the vicinity of microparticles' surface, by enforcing the tracers to stay close to the surface of the microparticles.

OMC14-04 14:15

Optical vortex induced forward transfer enables the high-definition 2-dimensional direct print of metallic microdots

Sayaka Kai[1], Rong Wei[1], Haruki Kawaguchi[1], Kanta Takahashi[1], Keisaku Yamane[2], Ken-ichi Yuyama[3], Satoyuki Kawano[4], Katsuhiko Miyamoto[1], Takashige Omatsu[1]
[1]Chiba University, [2]Hokkaido University, [3]Osaka Metropolitan University, [4]Osaka University

OV-LIFT allows direct printing of precise metallic microdots (diameter ~8 μm, positional error <7 μm), surpassing traditional ink-jet printing.

OMC14-05 14:30

High-speed AFM for direct observation of nanoscale deformation process of photo-manipulated azo-polymer

Keishi Yang[1], Feng-Yueh Chan[2], Yasushi Inouye[1,3], Prabhat Verma[1], Takayuki Uchihashi[2,4], Hidekazu Ishitobi[1,3], Takayuki Umakoshi[1,5]
[1]Dept. of Applid Physics, Osaka University, [2]Dept. of Physics, Nagoya University, [3]Graduate School of Frontier Biosciences, Osaka University, [4]Exploratory Research Center on Life and Living Systems, [5]Institute of Advanced Co-Creation Studies, Osaka University

Azo-polymer thin films exhibit a unique surface morphology under light irradiation due to the photoisomerization reaction. The morphology can be manipulated by controlling light properties such as polarization. Here, we demonstrate in-situ direct observation of the formation of the surface morphology on the azo-polymer film using high-speed atomic force microscopy. The change in surface morphology was precisely investigated in real time at the nanoscale.

Oral, Friday, 26 April PM

TILA-LIC <Room 315>

TILA-LIC10-02 14:00

Femtosecond Laser-Shock Processing: Fundamentals and Applications

Tomokazu Sano
Osaka University

Femtosecond laser-shock processing or Dry laser peening (DLP) enables improving fatigue performance of metallic materials using femtosecond laser pulses without a sacrificial overlay in air. This process has a potential to be applied to variety of industrial fields such as automotive, rail, aircraft, and space industries.

TILA-LIC10-03 14:15

Laser peening application of TILA for service life extension of metallic components

Yuji Sano[1,2]
[1]Institute for Molecular Science, National Institutes of Natural Sciences, [2]SANKEN, Osaka University

A tiny integrated laser (TILA) has been incorporated into a laser peening system to extend the service life of metallic components. By taking full advantage of the TILA's short pulse duration, it was confirmed that fatigue life was dramatically increased while minimizing harmful thermal effects on the surface.

TILA-LIC10-04 14:30

Gold nanoparticle synthesis using a microchip laser system through pulsed laser ablation in aqueous and organic solution

Yumi Yakiyama[1,2],
Barana Sandakelum Hettiarachchi[1],
Yusuke Takaoka[3], Yuta Uetake[1,2],
Hwan Hong Lim[4], Takunori Taira[4,5],
Mihoko Maruyama[6], Yusuke Mori[6],
Hiroshi Y Yoshikawa[3], Hidehiro Sakurai[1,2]
[1]Division of Applied Chemistry, Graduate School of Engineering, Osaka University, [2]Innovative Catalysis Science Division, Institute for Open and Transdisciplinary Research Initiatives (ICS-OTRI), Osaka University, [3]Division of Applied Physics, Graduate School of Engineering, Osaka University, [4]Division of Research Innovation and Collaboration, Institute for Molecular Science, [5]Laser-Driven Electron-Acceleration Technology Group, RIKEN SPring-8 Center, [6]Division of Electrical, Electronic and Infocommunications Engineering, Graduate School of Engineering, Osaka University

Microchip laser (MCL) was applied to PLAL of Au in both aqueous and organic media. Comprehensive investigation revealed that the resulting Au nanoparticles (NPs) sizes were almost fixed, while their yields were significantly different depending on the physical properties of the outer media.

NOTE

Oral, Friday, 26 April PM

ALPS <Room 303>

ALPS29-05 14:45

Thomson scattering diagnostics of EUV source plasmas and plasma disturbances by probing lasers

Kentaro Tomita, Yiming Pan
Hokkaido University

We have performed Thomson scattering measurements for EUV sources produced with 1.064 μm or 10.6 μm wavelength lasers. For further study, the possibility of laser-perturbation of plasmas by the probing lasers was investigated.

[ALPS-CL] 15:15-15:30
Closing Remarks
Chair: Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications

BISC <Room 419>

BISC10-04 14:45

Volume Hologram-based Airy Light-sheet Microscopy

Hung-Chuan Hsu[1], Sunil Vyas[2], Kuang-Yuh Huang[1], Hsien-Shun Liao[1], Yuan Luo[2,3,4,5]
[1]Department of Mechanical Engineering, National Taiwan University, [2]Institute of Medical Devices and Imaging System, National Taiwan University, [3]YongLin Institute of Health, National Taiwan University, [4]Department of Biomedical Engineering, National Taiwan University, [5]Graduate School of Advanced Technology, National Taiwan University

Light-sheet fluorescence microscopy (LSFM) offers rapid optical sectioning with low photobleaching and phototoxicity. Combining LSFM with Airy beams via volume holograms enhances the field of view and image quality, presenting advantages like expanded field of view, increased penetration depth, and improved imaging quality in measuring large biological samples.

BISC10-05 15:00

Metalens-based Light Sheet Fluorescence Microscope

Bo-Wei Huang[1], Hung-Chuan Hsu[1], Cheng Hung Chu[2], Ming Lun Tseng[3], Sunil Vyas[4], Ting-Yu Hsieh[4], Kuang-Yuh Huang[1,5], Din Ping Tsai[6,7,8], Yuan Luo[2,4,9,10]
[1]Department of Mechanical Engineering, National Taiwan University, [2]Yong-Lin Institute of Health, National Taiwan University, [3]Instituteof Electronics, National Yang Ming ChiaoTung University, [4]Institute of Medical Devices and Imaging System, National Taiwan University, [5]Graduate School of Advanced Technology, National Taiwan University, [6]Department of Electrical Engineering, City University of Hong Kong, [7]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [8]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, [9]Institute of Biomedical Engineering, National Taiwan University, [10]Program for Precision Health and Intelligent Medicine, National Taiwan University

In this work, a metalens-based Light sheet fluorescence microscopy (LSFM) is present. With the benefits of nanoscale dimensions of metalens, the complexity of the conventional LSFM system can be significantly reduced.

----- Coffee Break 15:15-15:30 -----

[BISC11] 15:30-17:00
Session 11
Chair: Masaki Hisaka
Osaka Electro-Communication University

BISC11-01 15:30 ***Invited***

Mid-infrared photothermal quantitative phase microscopy for label-free live-cell imaging

Takuro Ideguchi
The University of Tokyo

We have developed mid-infrared photothermal quantitative phase imaging (MIP-QPI) techniques, demonstrating their capability for high-speed and high-resolution live-cell microscopic measurements. Our systems significantly advance mid-infrared imaging methodologies.

HEDS <Room 311+312>

HEDS13-05 14:45

Super-collimated mono-energetic thermal spin-polarized neutron generator

Yasunobu Arikawa[1], Ryuya Yamada[1], Toru Sato[2], Lan Zechen[1], Wei Tianyun[1], Yuta Tatsumi[1], Alessio Morace[1], Akifumi Yogo[1], Takehito Hayakawa[3], Shinsuke Fujioka[1], Jun Yamasaki[4], Kazuhisa Sato[4], Tetsuya Yasuda[4], Ryosuke Kodama[1]
[1]Institute of Laser Engineering, Osaka University, [2]Research Center for Nuclear Science, Osaka University, [3]National Institutes for Quantum Science and Technology, [4]Research Center for Ultra-High Voltage Electron Microscopy, Osaka University

We propose a new concept of super-collimated mono energetic thermal neutron generator. The scheme can be applied to many HEDS experiments.

HEDS13-06 15:00

First demonstration of thermal neutron deflectometry by a laser driven intense magnetic field

Ryuya Yamada[1], Yasunobu Arikawa[1], Zhechen Lan[1], Tianyun Wei[1], Yuta Tatsumi[1], Yile Nan[1], Alessio Morace[1], Akifumi Yogo[1], Takehito Hayakawa[2], Jun Yamasaki[3], Kazuhisa Sato[3], Tetsuya Yasuda[3], Shinsuke Fujioka[1], Ryosuke Kodama[1]
[1]Institute of Laser Engineering, Osaka University, [2]National Institutes for Quantum Science and Technology, [3]Research Center for Ultra-High Voltage Electron Microscopy Osaka University

Thermal neutrons are directly generated via deuterium photodisintegration reaction by using LFEX. A clear beam splitting by the magnetic field are successfully observed which can probe magnetic field in the high energy density plasma.

----- Coffee Break 15:15-15:35 -----

[HEDS14] 15:35-17:00
High Energy Density Physics
Chair: Yasuhiko Sentoku
Osaka University

HEDS14-01 15:35

Generation of Ultrahigh Magnetic Fields by Microtube to Accelerate Charged Particles

Masakatsu Murakami, Sota Maruyama, Diya Pan
Osaka University

We propose a new scheme to generate ultrahigh magnetic fields - Micro-Toroidal (MT), which has a toroidal structure. Using the resultant magnetic fields generated in 100 fs, strong electric fields are generated, which can then be used for charged particle accelerations.

Oral, Friday, 26 April PM

LDC <Room 301>

LDC15-02 14:45

Temporal Domain Analysis of Optical Signal from Projectors

Takashi Ebara[1], Hiroshi Murata[1,2], Junichi Kinoshita[2], Kazuhisa Yamamoto[2]
[1]Mie University, [2]Osaka University

Optical signals from commercially available projectors were measured using a high-speed photodiode and real-time oscilloscope. Distinctive temporal patterns were observed in the measured signals, which are to accord with the display types of projectors.

----- Coffee Break 15:00-15:30 -----

[LDC16] 15:30-16:20
Post-Deadline Papers
Chairs: Tetsuya Yagi
Nichia Corporation
Sunao Kurimura
National Inst. for Materials Science

LDC16-01 15:30

3D Position Measurement by Deep-Learning-Assisted Single-Pixel Imaging for Gesture Recognition in Consideration of Privacy

Hiroki Takatsuka, Shiro Suyama, Hirotsugu Yamamoto
Utsunomiya University

This paper proposes a calculation method that 3D position measurement in single-pixel imaging with a single detector. By shifting the modulated illumination pattern, the 3D position is calculated by changing center-of-gravity position of the gesture in the reconstructed image by single-pixel imaging.

LDC16-02 15:40

Hollow Face Illusion Evoked by the Aerial 3D Image of Face-Like Characters Projected on a Spheroid

Takumi Watanabe, Hiroki Takatsuka, Shiro Suyama, Hirotsugu Yamamoto
Utsunomiya University

We confirmed that the aerial image of a face-like characters projected onto a spheroid evokes hollow face illusion even at binocular vision.

LSSE <Room 316>

LSSE-CL 14:50

Closing Remarks

OMC <Room 418>

OMC14-06 14:45

Nanoparticle assembly dynamics using Laguerre-Gaussian beams

Tatsunori Kishimoto[1], Yasushi Tanimoto[2], Kyouko Masui[2], Chie Hosokawa[2], Kentaro Doi[1]
[1]Toyohashi University of Technology, [2]Osaka Metropolitan University

In this study, focusing on nanostructures formed by Laguerre-Gaussian beam irradiation, we investigated the assembly dynamics of nanoparticles (NPs) as a model to understand the formation process of chiral nanostructures. Analyzing the fluorescence intensity and areas at the laser focal spot, we evaluated the assembled structure of NPs. Furthermore, particle tracking analysis for NPs attracted to the focal spot from the outside was performed.

----- Coffee Break 15:00-15:30 -----

[OMC15] 15:30-17:05
Session 13
Chair: Takashige Omatsu
Chiba University

OMC15-01 15:30

Single droplet formation with a focused near-infrared laser beam in the temperature responsive ionic liquid

Ken-ichi Yuyama, Maho Tanaka, Yasuyuki Tsuboi
Osaka Metropolitan University

We demonstrate single droplet formation in a thermo-responsive ionic liquid/water mixture by optical tweezers with a focused near-infrared laser beam. In optical tweezing at room temperature, nano-clusters are prepared due to local laser heating and trapped at focal spot to form a droplet. The current approach provides a new opportunity to concentrate molecular ions at a specific position.

Oral, Friday, 26 April PM

TILA-LIC <Room 315>

TILA-LIC10-05 14:45

Development of Dynamic Laser Ultrasonic System Mounted on Robot Arm Using Microchip Laser

Kazufumi Nomura, Norimitsu Okuyama, Takeru Inoue, Tomokazu Sano
Osaka University

The laser ultrasonic method enables non-contact ultrasonic detection. The dynamic laser ultrasonic system on a robot arm by using a compact microchip laser as the ultrasonic generation source was developed. The artificial back surface slit was measured and its detectability performance as a dynamic robot UT system was verified.

----- Coffee Break 15:00-15:30 -----

[TILA-LIC11] 15:30-17:00
Laser Systems & ALTA Project - 5
Chair: Xavier Mateos
University Rovira i Virgili, Spain

TILA-LIC11-01 15:30 ***Invited***

High power mode-locked thin-disk laser oscillator

Jinwei Zhang, Heyan Liu, Hongshan Chen
Huazhong University of Science & Technology, China

We report 100-W thin-disk laser oscillators with both standing-wave cavity and ring-cavity configurations. The pulse durations are both less than 300 fs. These laser sources have potential applications in many areas.

TILA-LIC11-02 16:00

Two wavelength oscillation for THz generationbased on microchip laser architecture

Hideho Odaka[1,2], Arvydas Kausas[1,2], Takunori Taira[1,2]
[1]RIKEN, [2]Institute for Molecular Science

DFG THz generation is power scalable method. Microchip laser can oscillate two wavelengths simultaneously for DFG. Experimental results of end-pumped MCL with a bonded microchip of two laser media will be reported.

TILA-LIC11-03 16:15

200-mJ Compact Deep-UV Laser System Using DFC-Power Chip and Microchip Laser

Kenichi Hirosawa[1], Junia Nomura[1], Mio Nishida[1], Nobuo Ohata[1], Arvydas Kausas[2,3], Vincent Yahia[3,2], Takunori Taira[2,3]
[1]Mitsubishi Electric Corporation, [2]RIKEN, [3]Institute for Molecular Science

We will report a compact deep-UV laser system designed on a breadboard scale, which generates 2 J laser pulses at 1064 nm and converts to 266 nm with 206 mJ and 580 ps pulse duration.

TILA-LIC-CL 16:30

Closing Remarks

Takunori Taira
RIKEN SPring-8 Center

NOTE

Oral, Friday, 26 April PM

BISC <Room 419>

BISC11-02 16:00

Au-incorporated semiconductor SERS substrate for highly sensitive molecular sensing

Yu Hsuan Wu, Ling Jyue Chen, Ting Yu Zheng, Chih Chia Huang
National Cheng Kung University, Taiwan

Semiconductor-metal synergy enhances SERS, offering cost-effective, self-cleaning substrates for high-sensitivity, rapid, and reusable detection in food safety, chemical sensing, and biomedical analysis.

BISC11-03 16:15

Reusable sensor for glucose concentration measurement with enzymatic no-core fiber

Cheng Chih Hsu Hsu[1], Shih-Han Hung[1], Chen-Ming Tsai[1], Cheng-Ling Lee[1], Chyan-Chyi Wu[2], Ching-Liang Dai[3]
[1]National United University, [2]Tamkang University, [3]National Chung Hsing University

In this study, we developed a reusable glucose fiber sensor to measure the phase difference produced by the chemical reaction between glucose and glucose oxidase (GOx). The best resolution of the proposed method is better than 1 mg/dl.

BISC11-04 16:30

Proposal of One-shot Type Mid-infrared Passive Spectroscopic Imager

Ruka Kobayashi, Daichi Anabuki, Hibiki Yano, Wei Qi, Hiroshi Kanasaki, Kenji Wada, Akiko Nishimura, Akira Nishiyama, Ichiro Ishimaru
Kagawa University

We proposed the one-shot type mid-infrared passive spectroscopic imager. The pea-sized apparatus, whose lens diameter was 6mm and optical axis length was less than 15mm, will be built in smartwatches for non-invasive blood glucose sensors.

BISC11-05 16:45

Broadband (3–20 μm) Mid-infrared Passive Spectroscopic Imaging for Gas Measurements using a Solar Background

Hibiki Yano[1], Wei Qi[1], Hiroshi Kanasaki[2], Kenji Wada[3], Akira Nishiyama[3], Ichiro Ishimaru[1]
[1]Faculty of Engineering and Design, Kagawa University, [2]Innovation Design Institute, [3]Faculty of Medicine, Kagawa University

Our passive spectroscopic imager can be constructed from wavelength-independent reflective optics using free-form mirrors, and we constructed a broadband (3–20 μm) passive spectroscopic imager using a microbolometer array sensor as a detector. In this report, we evaluate the short-wavelength region of the broadband passive spectroscopic imager and the detection of carbon monoxide gas, which is toxic.

HEDS <Room 311+312>

HEDS14-02 15:50

Control of multiscale expansion/ relaxation dynamics of micro-structured designed targets irradiated with a high-intensity laser

Ryutaro Matsui[1,2], Naoto Hayashi[1], Katsuya Kondo[1], Kazunari Matsuda[3], Kazuhiro Fukami[4], Hiroshi Sakaguchi[3], Shinichiro Masuno[5], Masaki Hashida[5,6], Shuji Sakabe[2,5], Shigeki Tokita[5], Yasuaki Kishimoto[1,2,3]
[1]Graduate School of Energy Science, Kyoto University, [2]Non-linear/ Non-equilibrium Plasma Unit (NPU), Kyoto University, [3]Institute of Advanced Energy (IAE), Kyoto University, [4]Graduate School of Engineering, Kyoto University, [5]Institute for Chemical Research (ICR), Kyoto University, [6]Research Institute of Science and Technology (RIST), Tokai University

In this study, we developed a silicon rod assembly with a high aspect ratio and performed a series of experiments concerning an interaction between a high-intensity laser and silicon rods/ CNT using a T^6 laser at ICR, Kyoto University.

HEDS14-03 16:05

Modelling of the non-Maxwellian response of DT plasmas to alpha particle transport in ICF hotspot

Bao Du
Institute of Applied Physics and Computational Mathematics

Modelling of the non-Maxwellian response of DT plasmas to alpha particle transport in ICF hotspot.

HEDS14-04 16:20

Analysis of the generation of relativistic electron-flux in long-timescale interactions with non-relativistic lasers

Yuji Takagi, Natsumi Iwata, Yasuhiko Sentoku
Osaka University

We have discovered the generation of fast electrons with energies of 100s of keV in laser-plasma interactions with laser intensities of about 10^{15} W/cm^2 and sub-nanosecond interaction time. We report the details of the generation and acceleration mechanism.

HEDS14-05 16:35

Particle acceleration and plasma heating in magnetized plasmas by large-amplitude standing whistler waves

Takayoshi Sano[1], Shogo Isayama[2], Shuichi Matsukiyo[2], Kaoru Sugimoto[3], Yasuhiko Sentoku[1]
[1]Osaka University, [2]Kyushu University, [3]Kyoto University

Laser-plasma interaction in a strong magnetic field has attractive properties regarding particle acceleration and plasma heating. We are focusing on the role of a standing wave created by counter-propagating circularly polarized whistler waves.

HEDS-CL 16:50

Closing Remarks

Takayoshi Sano
Osaka University

Oral, Friday, 26 April PM

LDC <Room 301>

LDC16-03 15:50

Imaging Distance Equation of Aquatic Image Derived by Paraxial Approximation

Ryosuke Ichikawa, Hiroki Takatsuka, Toru Iwane, Shiro Suyama, Hirotsugu Yamamoto
Utsunomiya University

We derive the imaging distance equation for aquatic image including refractive-index boundaries by the paraxial approximation and clarify its reliability within 6%.

LDC16-04 16:00

Proposal for a Compact Scrolling Aerial Display with Visually Interpolated Pixel Gaps by Striped Retro-reflector and Analysis of Viewing Angle

Tasaki Daichi[1], Akinori Tsuji[2], Toyotaro Tokimoto[1,3], Shiro Suyama[1], Hirotsugu Yamamoto[1]
[1]Utsunomiya University, [2]Tokushima University, [3]XAiX, LLC

We propose the compact scrolling aerial display using striped retro-reflector in front of the light source, and image scrolling can enable pixel interpolation perception by subjective super-resolution, resulting in natural aerial images. We also derive viewing angle formulation by using structure parameters, such as pixel gap to solve the problem of the narrow viewing angle by the striped retro-reflector mounted in front of the light source.

LDC16-05 16:10

Face Rotation Perception due to observer movement only by Flat Illustrations of Face-like Parts with Inverted Concave Depth Positions in Arc 3D Display

Kensuke Tamano, Shiro Suyama, Hirotsugu Yamamoto
Utsunomiya University

We clarified that flat illustrations of face-like parts is perceived to rotate due to horizontal observation movement by changing these depth positions as inverted concave depths in Arc 3D display. Although the flat illustrations of the face-like image with inverted concave depth position have no 3D features like real face or mask, the face rotation can be perceived by observer movement.

[LDC-CL] 16:20-16:35
Closing Remarks
Chair: Tetsuya Yagi
Nichia Corporation

OMC <Room 418>

OMC15-02 16:00

Microstructure formation by two-photon polymerization reaction using a focused femtosecond optical vortex

Yoshihisa Matsumoto, Kyoko Masui, Chie Hosokawa
Osaka Metropolitan University

We demonstrate the fabrication of microstructures using the two-photon polymerization reaction of photocurable resins with a femtosecond optical vortex to clarify the transfer mechanism of orbital angular momentum of the optical vortex to materials.

OMC15-03 16:15

Manipulation of membrane molecules in the lipid bilayer by optical trapping

Yasushi Tanimoto, Shunya Moriyama, Kyoko Masui, Chie Hosokawa
Osaka Metropolitan University

We study the diffusion properties of membrane molecules in an optical trap using artificial membranes to elucidate the optical trapping dynamics of cell surface molecules, which is useful for biological membrane research.

OMC15-04 16:30

Experimental and theoretical approaches for observing the interaction between biomolecules and optical vortex in deep-ultraviolet region

Koichi Matsuo[1,2,3], Hideki Kawaguchi[4], Kenta Kuroda[2,3], Ryota Imaura[2], Satosi Hashimoto[2], Yu Nishihara[2], Hiroshi Ota[5], Masahiro Katoh[1,2,5]
[1]Synchrotron Radiation Center, Hiroshima University, [2]Graduate School of Advanced Science and Engineering, Hiroshima University, [3]International Institute for Sustainability with Knotted Chiral Meta Matter (WPI-SKCM2), Hiroshima University, [4]Faculty of Science and Engineering, Muroran Institute of Technology, [5]Institute for Molecular Science

We constructed the deep-ultraviolet experimental systems for observing the interaction between optical vortex and biomolecules using synchrotron radiation and laser, and theoretically verified the existence of the interactions using a method of moments simulation.

OMC15-05 16:45

Complex amplitude signal detection method based on deep learning for holographic data storage

Jianying Hao[1], Xiaoqing Zheng[2], Xiao Lin[2], Soki Hirayama[1], Ryushi Fujimura[3], Xiaodi Tan[2], Tsutomu Shimura[1]
[1]The University of Tokyo, [2]Fujian Normal University, [3]Utsunomiya University

We propose a simple implementation of a complex-amplitude encoded HDS system and employs deep learning to realize multi-modulated signal detection. The complex amplitude signal can be retrieved from only one diffraction intensity image. The decoding of the 16-level complex amplitude has been experimentally validated, proving the feasibility of the proposed method.

OMC-CL 17:00

Closing Remarks

Takashige Omatsu
Chiba University

Poster Session <Exhibition Hall A>

Wednesday, 24 April

ALPSp1 10:30-12:00

ALPSp1-01

Investigations on offset spectral filtering in Yb-doped Mamyshev oscillator

Feihong Qiao, Zhiguo Lv
Inner Mongolia University

We research the influence of offset spectra filter on the laser parameter in an MO and then obtain ultrashort pulse generation with an average power of 2.2W and 49 fs pulse duration.

ALPSp1-02

In-situ monitoring system during high laser cutting

Kaede Takeuchi, Keiichiro Toyoshima, Yurina Michine, Hitoki Yoneda
The University of Electro-Communications

We have developed an in-situ monitoring system for adaptive laser machining processes, which includes several diagnostic techniques: scattering light diagnostics, emission spectroscopy, image analysis at the cutting cross-section, and dark-field imaging of gas and flare at the interaction area.

ALPSp1-03

Wavefront collection system for high-aspect-ratio nanometer hole drilling

Kanki Yoshida[2], Kyosuke Soma[2], Yurina Michine[1,2], Hitoki Yoneda[1,2]
[1]Institute for Laser Science, [2]University of Electro-Communications

It is effective to create very high aspect ratio nanometer hole with ultra-short pulse laser. By using careful tuning of wavefront in time and space, we achieve over 100micron depth hole of 180nm hole diameter with two micro Joule pulse energy.

ALPSp1-04

Development of 7-pass Fe:ZnSe amplifier seeded by KTA-based OPA at 3.9 um

Daiki Okazaki[1], Tsuneto Kanai[1], Linpeng Yu[2], Ryo Yasuhara[2], Shigeki Tokita[1]
[1]Institute for Chemical Research, Kyoto University, [2]National Institute for Fusion Science

We develop a 3.9-micron Fe:ZnSe chirped pulse 7-pass amplifier seeded by a three-stage KTA-based optical parametric amplifier, achieving single-pass gain of 10. The pulse energy finally reaches to 45 uJ via the seven-pass amplification.

ALPSp1-05

High-energy four-pulse passive coherent combining based on a Ti:sapphire bulk amplifier

Shigeki Oshima[1], Jin Akai[1,3], Yuhei Ueno[1,3], Hajime Sasao[2], Yasuhiro Miyasaka[3], Masayuki Suzuki[1], Hiroyuki Toda[1,3], Hiromitsu Kiriyama[1,3]
[1]Doshisha University, [2]Naka Fusion Institute (NFI), National Institutes for Quantum Science and Technology (QST), [3]Kansai Institute for Photon Science (KPSI), National Institutes for Quantum Science and Technology (QST)

A pulsed energy of 25 mJ from passive four amplified broadband pulse combining using Ti:sapphire bulk amplifier is demonstrated. This result is the highest pulse energy ever reported using passive coherent combining.

ALPSp1-06

Detection of laser-induced damage onset by the vibration

Ryoichi Akiyosi[1], Katsuhiro Mikami[1], Yasuhiro Miyasaka[2]
[1]kindai univ., [2]Kansai Institute for Photon Science (KPSI), National Institutes for Quantum Science and Technology (QST)

Quantitative, real-time laser-induced damage detection was demonstrated by occurred vibration with accuracy equivalent to microscopic evaluation. In addition, it was clarified that the variation of the vibrational spectra indicated the damage location.

ALPSp1-07

Development of Diagnostics for Laser-Plasma Interaction with Imaging and Spectroscopy of Scattered Intense Laser

Kentaro Sakai[1], Kosuke Himeno[2], Shuta J. Tanala[3], Tatiana Pikuz[2], Takafumi Asai[4], Yuki Abe[2], Takumi Minami[2], Kazumasa Oda[2], Soichiro Suzuki[2], Fuka Nikaido[2], Kiyochika Kuramoto[2], Toshiharu Yasui[2], Hideki Kohri[2], Masato Kanasaki[4], Kenji Kaji[4], Hiromitsu Kiriyama[5], Akira Kon[5], Kotaro Kondo[5], Nobuhiko Nakanii[5], Wei-Yen Woon[6], Che-Men Chu[6], Kuan-Ting Wu[6], Chun-Sung Jao[7], Yao-Li Liu[7], Shogo Isayama[8], Atsushi O. Tokiyasu[9], Harihara Sudhan Kumar[9], Kentaro Tomita[10], Yuji Fukuda[5], Yasuhiro Kuramitsu[2]
[1]National Institute for Fusion Science, [2]Osaka University, [3]Aoyama Gakuin University, [4]Kobe University, [5]National Institutes for Quantum Science and Technology, [6]National Central University, [7]National Cheng Kung University, [8]Kyushu University, [9]Tohoku University, [10]Hokkaido University

We have been developing the diagnostics of laser-plasma interaction with scattered intense laser. The images and spatially resolved spectra of scattered intense laser can be used to measure plasma structure and magnetic field, respectively.

ALPSp1-08

Laser stripping for H^- beam at J-PARC facility

Genki Onoda[1], Hitoki Yoneda[1], Yurina Michine[1], Aoi Fuchi[1], Hiroyuki Harada[2], Pranab Kumar Saha[2], Atsushi Sato[3], Michikazu Kinsho[2]
[1]The University of Electro-Communications, [2]JAEA/J-PARC, [3]NAT

Laser stripping is an attractive method for applying the charge exchange process in high-power proton accelerators. System design to reduce laser power is the most important issue. We will report on our demonstration experiment at the J-PARC facility.

ALPSp1-09

Low pulse repetition passively mode-locked lasers with multi-pass periodic trajectories in confocal cavity

Hsing-Chih Liang, Yu-Hsin Hsu, Pin-Wen Cheng
National Yang Ming Chiao Tung University

We demonstrate a low pulse repetition passively mode-locked laser with the zigzag multi-pass trajectories. The pulse repetition rates of 12 MHz and 9 MHz are achieved with the pulse durations of 10 ps.

ALPSp1-10

Long term mirror test for high average and high energy pulse lasers

Ryotaro Takahashi, Yurina Michine, Hitoki Yoneda
The University of Electro-Communications

We have conducted long-term mirror tests for high power laser optics. We evaluated several types of coating mirrors. After optimizing the pre-illumination, we achieved damage thresholds beyond 250 J/cm² for 1μm and 90 J/cm² for 0.53μm.

ALPSp1-11

Evaluation of Optical Loss Characteristics of Hetero-Core Optical Fiber Bending Sensor based on Displacement Test and Beam Propagation Analysis

Rikiya Tateishi[1], Kazuhiro Watanabe[2], Michiko Nishiyama[2], Yuya Koyama[1]
[1]Chiba Institute of Technology, [2]Soka University

We report that the bending characteristic in an optical loss of a hetero-core optical fiber sensor was evaluated by comparing experimentally obtained results in displacement tests and beam propagation analysis.

ALPSp1-12

Continuous-wave mid-infrared laser from intracavity OPO: exploring the elimination of self-pulsing effect

Chun-Yu Cho
National United University

The methods of eliminating self-pulsing from intracavity OPO are theoretically and experimentally explored for achieving efficient mid-infrared continuous-wave output. The methods including gain medium selection and inserting novel damping optics.

ALPSp1-13

Temporal dissipated solitons and spatiotemporal dissipated solitons in mode-locked fiber lasers

Changxi Yang[1], Chenxin Gao[1], Bo Cao[1], Chengying Bao[1], Xiaosheng Xiao[2]
[1]Tsinghua University, Beijing, [2]Beijing University of Posts and Telecommunications

We report on recent advances of temporal and spatiotemporal dissipated solitons in mode-locked fiber lasers. We demonstrate a new approach to stabilize spatiotemporal dissipated solitons in multimode fiber femtosecond lasers.

ALPSp1-14

Optical excitation effect by holding beam in pulsed current-driven Semiconductor Optical Amplifiers

Kaito Nagasawa, Yutaro Tashiro, Kazuyoku Tei
Tokai University

High contrast optical pulses are generated from a 900nm pulsed current-driven semiconductor optical amplifier using the holding beam technique.

ALPSp1-15

High-repetition-rate spectroscopic polarization measurement by a time-encoded supercontinuum vector beam

Yukihiro Inoue[1], Hayato Kobayashi[1], Hiroki Morita[1], Kazuyuki Sakaue[2], Toshitaka Wakayama[3], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]The University of Tokyo, [3]Saitama Medical University

We demonstrated 40-MHz detection of a spectroscopic polarization by a time-encoded supercontinuum vector beam. By detecting the time waveforms with a fast photodetector, the total measurement time was achieved to be 2.5 μs.

ALPSp1-16

Evaluation of dual-wavelength mutual saturable absorption characteristics of single-walled carbon nanotube films

Shohei Takada[1], Keisuke Fukazawa[1], Shotaro Kitajima[1], Ying Zhou[2], Takeshi Saito[2], Youichi Sakakibara[2], Norihiko Nishizawa[1]
[1]Nagoya University, [2]AIST

Dual-wavelength mutual saturable absorption characteristics of SWNT films were evaluated using fiber laser based dual-color pump-probe measurement. Observed maximum modulation depth was 3.63 % when 1 μm pump and 2 μm probe pulses were used.

ALPSp1-17

Coexistence of soliton and contin u o us wave in mode-locked fiber laser based on nonlinear multimode interference

Bole Song, Shan Wang, Zhiguo Lv
Inner Mongolia University

To the best of our knowledge, we realize the coexistence of soliton and continuous waves (CW) in a graded-index multimode fiber (GIMF) based anomalous disperision laser operated in L-band for the first time.

ALPSp1-18

Group refractive index measurement of glass samples using fiber-based supercontinuum laser

Ryo Kurihara[1], Hiroki Morita[1], Kento Kowa[2], Yoshitomo Nakashima[2], Hiroyuki Kowa[2], Naoji Oya[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Trioptics Japan Co., Ltd.

The refractive index of glass samples is an important parameter for designing optical devices. Here, we have developed the low-coherence interferometer using a supercontinuum laser, and measured the group refractive indices of a glass sample at 10 wavelengths in visible range. The results show a good agreement with the minimum deviation method within an uncertainty of 10-4. This method allows us to measure the refractive indices speedy and precisely.

ALPSp1-19

Development of soft material processing technology using ultrashort pulsed Er fiber laser

Kento Takaku, Yasushi Fujimoto
Chiba Institute of Technology

The establishment of microfabrication technology for soft materials will lead to technological developments in medicine, biotechnology, and other fields. The purpose of this study is to establish processing technology by laser.

Poster Session <Exhibition Hall A>

Wednesday, 24 April

ALPSp1 10:30-12:00

ALPSp1-20

Development of chromatic amplifier using Pr-doped waterproof fluoride glass fiber

Masaya Miyazaki, Yasushi Fujimoto
Chiba institute of technology

Single-color gain measurements experiments are demonstrated in Pr-doped waterproof fluoride glass fiber at 640 nm, 522 nm, and 487 nm. Multi-color gain measurements in the fiber are also tested.

ALPSp1-21

Development of high-power visible optical fiber laser

Kan Nishimura, Yasushi Fujimoto
Chiba Institute of Technology

We reported on a visible fiber laser using two double-clad structured Pr3+ -doped waterproof fluoro-aluminate glass fiber. We studied the configuration and power scaling of the amplifier to achieve a visible laser output power of 6 W.

ALPSp1-22

Joint measurement of electron density, temperature, and E UV spectrum of laser-produced tin plasma for nanolithography

Yiming Pan[1], Kentaro Tomita[1], Atsushi Sunahara[2,3], Akira Sasaki[4], Katsunobu Nishihara[3,5]
[1]Hokkaido University, [2]Purdue University, [3]Osaka University, [4]Kansai Institute for Photon Science, National Institutes for Quantum Science, [5]Osaka Metropolitan University

The plasma density, temperature and the emitted EUV spectra of Sn laser-produced plasmas (LPPs) was measured simultaneously, enabling the first experimental test of existing atomic model for Sn EUV source.

ALPSp1-23

Enhancement of laser produced Sn plasma EUV emission by multi-pulse YAG laser irradiations

Keishin Watanabe[1], Yuito Nishii[1], Tomoyuki Jozaki[1,2], Atushi Sunahara[2,3], Jia hao Wang[1], Kotaro Yamasaki[1], Takeshi Higashiguchi[4], Shinichi Namba[1]
[1]Hiroshima University, [2]Osaka University, [3]Purdue University, [4]Utsunomiya University

Tin bulk target was irradiated with multi-pulse Nd:YAG laser (1064 nm, 43 ps). By measuring EUV emission and spectral shape, the multi pulse effect was investigated.

ALPSp1-24

Portable femtosecond fiber laser system synchronizable with synchrotron X-ray pulses

Takumi Kyoda, Shuta Sugeta, Yoshihito Tanaka, Keisuke Kaneshima
University of Hyogo

Introducing a compact, portable femtosecond fiber laser system offering enhanced usability for time-resolved spectroscopy combining laser and synchrotron X-ray pulses.

ALPSp1-25

Development of regenerative liquid bismuth target for shorter wavelength light source

Tatsuya Soramoto[1], Ayaka Ogiwara[1], Tsukasa Sugiura[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

We developed regenerative liquid bismuth target and observed soft x-ray spectra using it. The number of photons was 1.1×10^{13} photons/nm·sr·pulse at peaks at a wavelength of 4.2 nm.

ALPSp1-26

Efficient soft x-ray generation by spectral control of Bi plasma

Tomoyoshi Toida[1], Takeru Niinuma[1], Masaki Kume[1], Tsukasa Sugiura[1], Hayato Yazawa[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

We measured soft x-ray spectra from laser-produced Bi plasma in dual laser scheme. To improve conversion efficiency, it is suggested to prevent the formation of low-temperature regions of Bi plasma.

ALPSp1-27

Development of a regenerative amplifier using a Yb:YAG thin-disk with liquid metal bonding

Ayaka Ogiwara[1], Shuma Ako[1], Hiroki Morita[1], Kazuyuki Sakaue[2], Tatsunori Shibuya[3], Ryunosuke Kuroda[3], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]The University of Tokyo, [3]AIST

We developed a regenerative amplifier using a thin-disk bonded by liquid Ga with high cooling efficiency. The maximum pulse energy was 1 mJ, which was higher than that for the conventional bonding method.

ALPSp1-28

Active control of B-EUV emission spectra

Masaki Kume[1], Tsukasa Sugiura[1], Hayato Yazawa[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

The spectral shape of the B-EUV source from a laser-produced gadolinium (Gd) plasma was actively controlled by the dual laser pulses irradiation. We will report on B-EUV spectra, spectral purity, and estimated conversion efficiency.

ALPSp1-29

Study on Nanosecond Laser Processing of Candidate Materials for Plasma-Facing Components in Nuclear Fusion Devices

Haotian Yang[1], Ryo Yasuhara[1,2], Hiroyuki Noto[1,2], Daisuke Nagata[2], Masayuki Tokitani[1,2], Haruki Kawaguchi[1,2], Chihiro Suzuki[1,2], Reina Miyagawa[3], Hiyori Uehara[1,2]
[1]The Graduate University for Advanced Studies, [2]National Institute for Fusion Science, [3]Nagoya Institute of Technology

The effect of nanosecond Nd: YAG laser processing on the grain structure and mechanical properties of tungsten is evaluated in detail.

ALPSp1-30

Development of a high-power, compact amplifier using Yb:YAG thin-rod

Shotaro Hirao[1], Yasuhiro Kamba[2], Hiroki Morita[1], Yasuaki Moriai[2], Atsushi Fuchimukai[2], Taisuke Miura[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Gigaphoton Inc.

We demonstrated a 30-ns, 1030-nm amplification method based on a 30-mm long Yb:YAG thin rod. The amplified power was achieved to be 32 W at a repetition rate of 6 kHz and a total pump power of 220 W with 1-pass amplification.

ALPSp1-31

Development of an Er-fiber Comb Using Semiconductor Saturable Absorber with an Intra-Cavity Electro-Optic Modulator

Tsubasa Kashimura[1], Yohei Sugiyama[1], Yuki Toyoda[1], Yoshiaki Nakajima[2], Daisuke Akamatsu[1], Feng-Lei Hong[1]
[1]Yokohama National University, [2]Toho University

We demonstrated an all-polarization-maintaining Er-fiber comb using a semiconductor saturable absorber mirror and an intra-cavity waveguide electro-optic modulator (EOM). The EOM is used to stabilize the repetition frequency of the comb with a high-speed servo.

ALPSp1-32

Utilizing Single Fiber Bragg Grating inside Fiber Ring Cavity to Reach Dual-Wavelength Output with Single-Longitudinal-Mode

Kuan-Ming Cheng[1], Tsu-Hsin Wu[1], Teng-Yao Yang[1], Yu-Ting Lai[1], Lan-Yin Chen[1], Chun-Yen Lin[1], Chien-Hung Yeh[1], Jing-Heng Chan Chan[1], Chi-Wai Chow[2]
[1]Feng Chia University, [2]National Yang Ming Chiao Tung University

The proposed erbium fiber ring laser configuration with single-longitudinal-mode output by using a fiber Bragg grating in a ring cavity. Hence, based on the nonlinear effect of laser configuration, the down-converted dual-wavelength can be generated.

ALPSp1-33

Dual comb spectroscopy measurement using all-polarization maintainingsingle-cavity SWNT mode-locked dual-comb fiber laser

Yifei Zhu, Shotaro Kitajima, Norihiko Nishizawa
Nagoya University

HCN gas absorption spectroscopy using all-PM single-cavity dual comb fiber laser was demonstrated. With 25-fold averaging, a high signal-to-noise ratio was achieved, enhancing the precision of the spectral data.

ALPSp1-34

Laser frequency stabilization using an optical frequency comb for quantum communication

Koji Nagano[1], Takuto Nihashi[2], Daisuke Yoshida[1,2], Shogo Matsunaga[2], Daisuke Akamatsu[2], Feng-Lei Hong[2], Tomoyuki Horikiri[1,2]
[1]LQUOM Inc., [2]Yokohama National University

For quantum communication, quantum repeaters are essential. Within the quantum repeater, laser frequency stabilization system operating at multiple wavelengths is required and can be realized with an optical frequency comb. We have demonstrated this system.

ALPSp1-35

Comparison of spectral normalization techniques in dual-comb spectroscopy

Naoki Takeshi[1], Ryusei Uchiyama[1], Kousuke Kubota[1], Takumi Yumoto[1], Yohei Sugiyama[2], Hong Lei Feng[2], Yoshiaki Nakajima[1]
[1]Toho University, [2]Yokohama National university

Interferograms acquired via dual-comb spectroscopy were subjected to normalization using two distinct techniques: polynomial fitting and reference interferogram. The normalized spectra were compared to acetylene gas absorption data from HITRAN database.

ALPSp1-36

Synthesis and luminescence properties of Nb-based luminescent phosphor

Hayato Sato[1], Shohei Kodama[1], Shunsuke Kurosawa[2,3,4], Ikuo Yanase[1], Hiroaki Takeda[1]
[1]Saitama University, [2]Institute for Materials Research, Tohoku University, [3]New Industry Creation Hatchery Center, Tohoku University, [4]Institute of Laser Engineering, Osaka University

The anisotropic scintillation properties of YVO_4 with strong birefringence were evaluated as a candidate inorganic scintillator for dark matter search. In addition, impurity-doped YVO_4 and $YNbO_4$ were synthesized to improve the scintillation light output.

ALPSp1-37

Preparation of Al_2O_3–$Yb_3Al_5O_{12}$ composite films using CVD method and comparison of their microstructure with composite bulks

Natsumi Imai[1], Shunsuke Kurosawa[2,3], Daisuke Matsukura[2], Akihiro Yamaji[2], Akihiko Ito[1]
[1]Yokohama National University, [2]Tohoku University, [3]Osaka University

We prepared Al_2O_3–$Yb_3Al_5O_{12}$ (YbAG) composite films using chemical vapor deposition and compared their microstructures with composite bulks grown using micro-pulling down method.

Poster Program

Poster Session <Exhibition Hall A>

Wednesday, 24 April

ICNNp 10:30-12:00

ICNNp-01

Redistribution of carrier between two localization centers in InGaN multiple quantum well

Zilan Wang[1], Bo Liu[2], Lai Wang[2]
[1]Dalian University of Technology, [2]Tsinghua University

The carrier dynamics in InGaN/GaN multiple quantum wells are independently divided into two localizations, namely the fluctuation of the indium content and the inhomogeneity of the electric field between each quantum well.

ICNNp-02

Influence of Doping on the Performance of Graphene-based Hybrid Photo d etectors

Ying Luo
University of Electronic Science and Technology of China

In this poster, we present findings from simulations and experiments elucidating how graphene doping impacts the performance of graphene–silicon hybrid photoconductors.

ICNNp-03

Integrated Silicon Slab Single-Photon Avalanche Detectors for Visible Light: a Simulation Study

Thomas YL Ang[2], Ray JH Ng[2], Aswin Alexander[1], Anirudh R Ramaseshan[1], Victor Leong[1]
*[1]Institute of Materials Research and Engineering, A*STAR, [2]Institute of High Performance Computing, A*STAR*

We explore integrated single-photon avalanche detectors (SPADs) based on silicon slab waveguides by performing a Monte Carlo simulation study. These SPADs yield a photon detection efficiency of up to almost 70%.

ICNNp-04

Developing Integrated Quantum Photonics Via a National Foundry Platform

Adrian Nugraha Utama[1], Simon Chun Kiat Goh[2], Naga Manikanta Kommanaboina[1], Yanyan Zhou[2], Hongyu Li[2], Victor Leong[1], Manas Mukherjee[1,3]
*[1]Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR), Singapore, [2]Institute of Microelectronics (IME), Agency for Science, Technology and Research (A*STAR), Singapore, [3]Centre for Quantum Technologies, National University of Singapore, Singapore*

We present recent photonic devices that are designed, fabricated, and characterized within our national foundry platform. We discuss several aspects, including automation, device performance, and quantum application.

ICNNp-05

Enhancing NbTiN superconducting nanowire single-photon detectors using helium ion irradiation

Fabian Wietschorke[1], Stefan Strohauer[2], Christian Schmid[1], Lucio Zugliani[1], Rasmus Flaschmann[1], Stefanie Grotowski[2], Manuel Müller[3], Björn Jonas[1], Matthias Althammer[3], Rudolf Gross[3], Jonathan Finley[2], Kai Müller[1]
[1]Walter Schottky Institute and School of Computation, Information and Technology, Technical University of Munich, 85748 Garching, Germany, [2]Walter Schottky Institute and School of Natural Sciences, Technical University of Munich, 85748 Garching, Germany, [3]Walther-Meißner-Institut, 85748 Garching, Germany

We present NbTiN superconducting nanowire single-photon detectors showing a strongly increased system detection efficiency after Helium ion irradiation as well as a detailed study of the defect creation in NbTiN due to the ion bombardment.

ICNNp-06

Prediction Algorithm for Determining Parameters of Broadband Metamaterial

Kenta Hamada, Kubo Wakana
Tokyo University of Agriculture and Technology

Metamaterial (MA) thermoelectric conversion is a new mechanism that enables thermoelectric power generation in a uniform thermal radiation environment. In this study, we optimized a parallel structure of hyperbolic metamaterials (HMMs), which exhibit broadband absorption, and evaluated their absorption characteristics. By using deep reinforcement learning, HMMs exhibiting broadband absorption were successfully designed.

ICNNp-07

Fast Optical Phased Array Calibration Leveraging Transfer Learning Based Convolutional Neural Network

Wanchang Gao, Weiming Yao, Haoshuai Mou, Xiaochuan Xu
State Key Laboratory on Tunable Laser Technology, Harbin Institute of Technology, Shenzhen

We proposed a transfer learning-based CNN algorithm to achieve rapid calibration for the silicon photonics optical phased array and conducted experimental validation for this algorithm in a 16-channel OPA.

ICNNp-08

Optical Property Changes of Silver and Gold Nanodisk Structures by Thermal Annealing

Kota Yamasaki, Masaki Ozawa, Ryohei Hatsuoka, Tetsuya Matsuyama, Kenji Wada, Koichi Okamoto
Osaka Metropolitan University

We reproduced the localized surface plasmon peak shifts induced by thermal annealing in silver and gold nanodisk structures using numerical simulation. The differences in optical property changes between silver and gold will be discussed.

ICNNp-09

Metalens Design for Symmetric Airy Beams

Yi-Ting Chen[1], Sunil Vyas[2], Cheng Hung Chu[4], Kuang-Yuh Huang[3], Yuan Luo[2,4]
[1]Nanoengineering and Nanoscience, GSAT, National Taiwan University, Taipei 10617, Taiwan, [2]Institute of Medical Devices and Imaging System, National Taiwan University, Taipei, 10051, Taiwan, [3]Department of Mechanical Engineering, National Taiwan University, Taipei 10617, Taiwan, [4]Yong-Lin Institute of Health, National Taiwan University, Taipei, Taiwan

In this paper, we propose a dielectric metasurface using silicon for a unit cell on a silicon oxide substrate for generating symmetric airy beams, which has the peculiar property of abrupt autofocusing [3].

ICNNp-10

High-performance water-resistant subwavelength perovskite single-mode laser

Juan Du[1], Sihao Huang[2], Zhengzheng Liu[2], Yuxin Leng[2]
[1]Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, [2]Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

We developed defect-suppressed thermal-evaporated perovskite thin films with superior gain characteristics by combining an improved triple-source co-evaporation strategy with a transparent SiO_2 plate, enabling stable operation of high-performance subwavelength-scale perovskite lasers underwater.

OPTMp 10:30-12:00

OPTMp-01

Installation of the photosensor for the underwater laser scanner

Yutaka Hasegawa[1], Keisuke Akiyama[1], Takamitsu Okada[2], Shojiro Ishibashi[3]
[1]HAMAMATSU PHOTONICS K.K., [2]Mitsubishi Electric Defense and Space Technologies Corp., [3]Japan Agency for Marine-Earth Science and Technology

We developed the microchannel plates (MCP) Photomultiplier tubes (PMT) for the underwater laser scanner. This MCP-PMT achieved higher sensitivity and longer life in comparison with conventional products.

OPTMp-02

Development of the doppler laser system for under water vehicle speed measurement

Takamitsu Okada[1], Keisaku Takada[1], Shojiro Ishibashi[2]
[1]Mitsubishi Electric Defense and Space Technologies Corporation, [2]Japan Agency for Marine-Earth Science and Technology

We developed the doppler laser system for under water vehicle speed measurement. This prototype system measures the doppler velocity of suspended solids in the ocean by capturing the reflected light from suspended solids.

OPTMp-03

Discussion on measurement uncertainty used in laser interference measurement of annular end face of workpieces

Hsiao-Yu Chou, Hui-Jean Kuo, Chao-Te Lee, Jung-Ru Yu, Chien-Yao Huang
Taiwan Instrument Research Institute, National Applied Research Laboratories

This article discusses the allowable range changes and industrial applications caused by introducing measurement uncertainty based on the data obtained from 2528 pieces of wafer moving mechanism ejector pins inspected with laser interferometry technology.

OPTMp-04

Advancing Optical Gas Sensor for Sulfur Dioxide Detection in Volcanic Environment

Hsin-Yi Tsai, Ching-Ching Yang, Chin-Ning Hsu, Kuo-Cheng Huang, Chih-Chung Yang
Taiwan Instrument Research Institute, National Applied Research Laboratories

We developed the optical gas sensor for concentration detection such as sulfur dioxide, which has strong correlation between light intensity and SO2 concentration, and can be applied to gas concentration monitoring in volcanic environment.

OPTMp-05

Online Monitoring System Development for Ultrasonic Processing of Optical Materials

ChienYao Huang, ChungYing Wang, JunCheng Chen, ShuCheng Shyu
Taiwan Instrument Research Institute, National Applied Research Laboratories

This study employs a CNC milling machine with an ultrasonic-assisted processing module, applied to optical material processing. Combined with an online dimensional measurement module and various sensors, this system allows real-time monitoring of processing accuracy.

Poster Session <Exhibition Hall A>

Wednesday, 24 April

OPTMp 10:30-12:00

OPTMp-06

Enhancing Cup Grinding Wheel Monitoring: Automated Boundary Adjustment Algorithm for Precision Profile Measurement

Chung-Ying Wang[1], Shih-Chieh Lin[2], Chien-Yao Huang[1], Jun-Cheng Chen[1], Shu-Cheng Shyu[1]
[1]Taiwan Instrument Research Institute, NARLabs, [2]National Tsing Hua University

Introduction of an algorithm for automatic boundary adjustment in cup grinding wheel profile data, enhancing wear metrics accuracy.

OPTMp-07

Measurement of absolute length difference based on optical fiber interferometer

Xin Lai[1], Qiuheng Song[2], Yixiao Ma[1], Yuchen Song[1], Kun Jia[1], Lai Zhang[1], Yuanyuan Sun[1], Pengwei Zhou[1], Hekuo Peng[1], Qian Xiao[1], Bo Jia[1]
[1]Fudan University, [2]Sichuan Fujinan Technology CO., LTD

A method of measuring the absolute length difference between two arms of optical fiber interferometer based on the phase modulation of light source is proposed. The method is suitable for both short-distance and long-distance optical fiber interference systems, and implementable for compensating and measuring absolute length difference of in-service optical fiber interferometer.

OPTMp-08

Enhancing Glass Grinding Efficiency Integrating Machine Learning and Heuristic Techniques

Yen Han Chiang[1], Chien-Yao Huang[2], Chung-Ying Wang[2]
[1]National Center for High-performance Computing National Applied Research Laboratories, [2]National Applied Research Laboratories Taiwan Instrument Research Institute

Study integrates machine learning and heuristic algorithms to enhance glass grinding, improving surface roughness and efficiency by over 3.5% and 10%, respectively.

OPTMp-09

Evaluation of Long-Term Stability of Gloss Calibration

Hui-Jean Kuo, Meng-Jie Lin, Ho-Lin Tsay, Chien-Yao Huang
National Applied Research Laboratories, Taiwan Instrument Research Institute

In this paper, we propose a method to replace previous long-term stability assessments. The results show that more accurate long-term stability uncertainties can be obtained using this method.

OPTMp-10

Development of Smart Spindle Applied for Brittle Materials Polish

Rou-Jhen Chen[1], Yi-Cheng Lin[1], Ray-Ching Hong[1], Shiau-Cheng Shiu[2], Ruei-Feng Tsai[3], Chun-Wei Liu[2], Wen-Tse Hsiao[1]
[1]Taiwan Instrument Research Institute National Applied Research Laboratories, [2]Department of Power Mechanical Engineering, National Tsing Hua University, [3]WINDIRS TECHNOLOGY CO.LTD.

In the view of this, this study to develop a sensing polishing head and a sensing polishing spindle as the smart aerostatic spindle for use in the optical component polishing process.

XOPTp 10:30-12:00

XOPTp-01

Europium Doped Zinc Oxide Thin Films Grown by Pulsed-Laser Deposition

Wei-Lon Wei[1], Tzu-Chi Huang[3,1], Yu-Hao Wu[4,1], Chien-Yu Lee[1], Bo-Yi Chen[1], Gung-Chian Yin[1], Bi-Hsuan Lin[1], Fang-Yuh Lo[2], Mau-Tsu Tang[1]
[1]National Synchrotron Radiation Research Center, Hsinchu 300092, Taiwan, [2]Department of Physics, National Taiwan Normal University, Taipei 11677, Taiwan, [3]Department of Chemical Engineering, National United University, Miaoli 360302, Taiwan, [4]Department of Materials Science and Engineering, National Yang Ming Chiao Tung University, Hsinchu 30010, Taiwan

The Eu-doped ZnO thin film samples had been deposited via pulsed-laser deposition. PL, XANES and XRF mapping had been utilized to characterize the samples.

XOPTp-02

Fabrication of X-ray absorption gratings with 9 μm period by centrifugal deposition

Ren Nasukawa[1], Yui Bishago[1], Kentaro Kajiwara[3], Xiaoyu Liang[1,2], Wataru Yashiro[1,2,4,5]
[1]Tohoku University, [2]IMRAM, [3]JASRI, [4]SRIS, [5]The University of Tokyo

A challenge in X-ray grating interferometer is to fabricate high-aspect-ratio absorption X-ray gratings. While gold electro plating is commonly used to fill trenches of gratings, centrifugal deposition may be viable alternative as low-cost and high-throughput method. In this study, we fabricated an absorption grating with 9 μm period and 54 μm trench depth by centrifugal deposition and achieved visibility of 25.6 % in Talbot interferometry.

XOPTp-03

Development of high-precision electroformed Wolter mirror for X-ray telescope

Shutaro Mohri[1], Shunsuke Ito[1], Satoru Egawa[1], Hiroto Motoyama[1], Guo Jianli[1], Gota Yamaguchi[2], Takehiro Kume[3], Yusuke Matsuzawa[3], Hidekazu Takano[2], Yoshiki Kohmura[2], Makina Yabashi[2], Hidekazu Mimura[1,2]
[1]The University of Tokyo, [2]SPring-8, RIKEN, [3]Technology Center, Natsume Optical Corporation

We newly developed the figure correction apparatus for the master mandrel to improve the figure accuracy of Wolter mirror equipped as imaging optics in FOXSI-4 project. The imaging performance of Wolter mirror fabricated with the mandrel was evaluated at BL29XU, SPring-8. HPD of EEF was 4 arcsec and 17 arcsec when X-ray of 12 keV was applied to the machining area, and the non-machining area, respectively.

XOPTp-04

Development and Optimisation of a Table-Top Soft X-Ray Light Source using Novel Techniques

Ruairí Brady, Kevin Mongey, Ben Delaney, Emma Sokell, Fergal O'Reilly
University College Dublin

This paper presents an update on the development of a high radiance, laser-produced plasma soft x-ray light source. Radiance optimisation techniques and novel engineering strategies are discussed.

XOPTp-05

Scanning X-ray Fluorescence Microscopy using white SR at SAGA Light Source

Akio Yoneyama[1], Masahide Kawamoto[1], Satoshi Takaya[2]
[1]SAGA Light Source, [2]National Institute of Advanced Industrial Science and Technology

The X-ray energy of a scanning X-ray fluorescence microscope at SAGA Light Source was increased from 6 to 10 keV by introducing new mirrors with a designed incidence angle of 5 mrad to increase sensitivity to heavy elements.

XOPTp-06

Quantum correlation between spin of photoelectrons and polarization of emitted X-ray photons in 3d transition metal oxides

Ryo Barnabas Tanaka, Takayuki Uozumi
Osaka Metropolitan University

To investigate the character of quantum entanglement in X-ray region, we theoretically investigate the entanglement between the spin of photoelectrons and the polarization of emitted photons in XEPECS process for 3*d* transition metal oxides, where XEPECS means coincidence spectroscopy of photoelectrons and emitted X-ray photons. We will discuss the effect of M3d – O2p hybridization and intra-atomic multiplet on the spin-polarization quantum correlation.

XOPTp-07

New and old challenges for X-Ray Optics critical components at European XFEL

Maurizio Vannoni, Immo Bahns, Mikako Makita, Idoia Freijo Martin, Liubov Samoylova, Silja Schmidtchen, Kelin Tasca, Marziyeh Tavakkoly, Antje Trapp, Harald Sinn
European XFEL GmbH, Germany

The European XFEL is a X-ray free-electron laser facility that provides x-ray radiation with outstanding characteristics. The same characteristics that are potentially enabling completely new kind of experiments are also creating unique and demanding specifications for the needed optical devices. I will show the most critical components that are still in very high demand at European XFEL even after 6 years of Operations and their impact to upgrade projects.

XOPTp-08

Development of High-resolution Space X-ray Optics for the Solar Flare Sounding Rocket FOXSI-4: Vibration Test

Ryuto Fujii[1], Koki Sakuta[1], Kazuki Ampuku[1], Yusuke Yoshida[1], Takashi Ito[1], Kumiko Okada[1], Keitoku Yoshihira[1], Tetsuo Kano[1], Naoki Ishida[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shunsuke Ito[8], Shutaro Mohri[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8], Ikuyuki Mitsuishi[1]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Meijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/ SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

We have been developing our original space X-ray telescopes for a solar sounding rocket experiment FOXSI-4 with a combination of space- and ground-based technologies. We confirmed tolerance of the telescopes to vibration during rocket launch.

XOPTp-09

Development of High-resolution Space X-ray Optics for the Solar Flare Sounding Rocket FOXSI-4: Ray-tracing Simulation

Yusuke Yoshida[1], Koki Sakuta[1], Kazuki Ampuku[1], Ryuto Fujii[1], Kumiko Okada[1], Keitoku Yoshihira[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shunsuke Ito[8], Shuntaro Mohri[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8], Ikuyuki Mitsuishi[1]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Meijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

In order to quantitatively interpret the measured data and create response functions for our X-ray optics, we have constructed our original ray tracing simulator. We have confirmed that the absolute values of the effective area as a function of an energy and the relative values as a function of an off-axis angle are consistent with simulation results. We will report the details of the results.

XOPTp-10

Development of monolithic bimorph mirror based on single crystal piezoelectric element for variable beam size optical system

Junya Yoshimizu[1], Takato Inoue[1,2], Yoshiki Kohmura[3], Makina Yabashi[3], Satoshi Matsuyama[1,2]
[1]Nagoya University, [2]Osaka University, [3]RIKEN SPring-8 Center

To realize a variable beam size optical system for multiple X-ray analyses, we have developed a new monolithic bimorph mirror based on a single-crystal piezoelectric element that has a simple structure but can have large deformation. The proof-of-concept test performed at SPring-8 showed that the beam size can be changed between 1 mm and sub 1 μm at an X-ray energy of 10 keV.

XOPTp-11

Development of high-resolution X-ray microscope with multilayer AKB mirror for 17.5 keV X-ray

Satsuki Ito[1], Kazuhiko Omote[2], Raita Hirose[2], Takato Inoue[1,3], Sota Nakabayashi[1], Haruhito Iriyama[1], Jumpei Yamada[3], Yoshiki Kohmura[4], Makina Yabashi[4], Satoshi Matsuyama[1,3]
[1]Nagoya University, [2]Rigaku Corporation, [3]Osaka University, [4]RIKEN

A high-resolution X-ray microscope was developed with a large-NA multilayer AKB mirror for 17.5 keV X-rays. A performance test conducted at SPring-8 demonstrated that minimum structure with 20 nm width of a test chart could be clearly resolved.

Poster Session <Exhibition Hall A>

Wednesday, 24 April

XOPTp 10:30-12:00

XOPTp-12

High-speed X-ray Imaging of Electrical Discharge Machining (EDM)

Hiroto Motoyama[1], Yusuke Kudo[1], Satoru Egawa[1], Gota Yamaguchi[2], Shota Yamamoto[1], Ryosuke Kawashima[1], Jianli Guo[1], Hirokatsu Yumoto[2,3], Takahisa Koyama[2,3], Hidekazu Takano[2], Yujiro Hayashi[2], Haruhiko Ohashi[2,3], Makina Yabashi[2], Hidekazu Mimura[1,2]
[1]The University of Tokyo, [2]RIKEN, [3]JASRI

High-speed X-ray imaging technique is applied to electric discharge machining. Distinctive vibration patterns were extracted from X-ray movies. We discuss the analysis results at the conference.

XOPTp-14

4D-CT imaging of lathe drilling of steel workpieces using synchrotron X-rays at 100 keV

Satoru Egawa[1], Ryosuke Kawashima[2], Shota Yamamoto[2], Hiroto Motoyama[1], Gota Yamaguchi[3], Yusuke Kudo[2], Jianli Guo[1], Hirokatsu Yumoto[3,4], Takahisa Koyama[3,4], Hidekazu Takano[3], Yujiro Hayashi[3], Haruhiko Ohashi[3,4], Makina Yabashi[3,4], Hidekazu Mimura[1,3]
[1]Research Center for Advanced Science and Technology, The University of Tokyo, [2]Department of Precision Engineering, School of Engineering, The University of Tokyo, [3]RIKEN SPring-8 Center, [4]Japan Synchrotron Radiation Research Institute

4D-CT imaging of lathe drilling of steel workpieces was demonstrated using synchrotron X-rays at BL05XU of SPring-8. We observed lathe drilling, in which a workpiece is rotated while a drill is kept stationary. Assuming the shape of the workpiece does not change during one rotation, its three-dimensional structure can be reconstructed by CT.

XOPTp-15

Development of X-ray wavefront-corrected multilayer mirrors for high-resolution holography imaging

Kota Shioi[1], Jumpei Yamada[1], Atsuki Ito[1], Ichiro Inoue[2,3], Taito Osaka[2,3], Gota Yamaguchi[2], Yuichi Inubushi[2,3], Daisetsu Toh[1], Yasuhisa Sano[1], Makina Yabashi[2,3], Kazuto Yamauchi[1]
[1]Osaka University, [2]RIKEN SPring-8 Center, [3]JASRI

X-ray propagation-based holography is a promoting phase-contrast imaging techniques for fast non-destructive observation in a single shot. We have been using X-ray mirror optics to make available a beam with a small focusing diameter and high flux. To enhance resolution, surface roughness must be controllable to the nano-level. We report on the basic study of tungsten silicide, which is useful for reducing surface roughness.

XOPTp-16

Towards Stimulated X-Ray Raman Scattering Imaging System Using X-Ray Free-Electron Laser

Yu Nakata[1], Jordan T. O'Neal[1,3], Kai Sakurai[1,2], Kyota Yoshinaga[1], Takenori Shimamura[1,2,3], Takashi Kimura[1,3]
[1]The University of Tokyo, [2]Japan Synchrotron Radiation Research Institute, [3]RIKEN

Our final goal is to realize the stimulated X-ray Raman scattering imaging using an X-ray free-electron laser. To this end, we estimated the signal intensity and considered the optimal optics for the experiment.

XOPTp-17

High-pressure plasma etching for a finish processing of a micro channel-cut crystal monochromator

Masafumi Miyake[1], Shotaro Matsumura[1], Iori Ogasahara[1], Taito Osaka[2], Kazuto Yamauchi[1], Makina Yabashi[2,3], Yasuhisa Sano[1]
[1]Osaka University, [2]RIKEN/SPring-8, [3]JASRI

We proposed the high-pressure plasma etching method to fabricate a micro channel-cut crystal monochromator for reflection self-seeding XFEL. In this presentation, we will talk its processing characteristics.

XOPTp-18

XAFS-imaging & phase-contrast imaging via a full-field X-ray microscope based on Advanced Kirkpatrick–Baez mirror

Atsushi Yakushigawa[1], Jumpei Yamada[1,2], Tomoya Uruga[3], Hidekazu Takano[2], Hirosuke Matsui[4], Daisetsu Toh[1], Yasuhisa Sano[1], Makina Yabashi[2,3], Kazuto Yamauchi[1]
[1]Osaka University, [2]Riken SPring-8 Center, [3]JASRI, [4]Nagoya University

In the presentation, we will report detailed specifications of the nano-XAFS/CT system installed to SPring-8 BL36XU and recent results of high-resolution XANES imaging and propagation-based phase contrast imaging.

XOPTp-19

Development of scanning-imaging X-ray microscope using advanced Kirkpatrick–Baez mirror

Atsuya Nagamatsu[1], Jumpei Yamada[1], Atsushi Yakushigawa[1], Akihisa Takeuchi[2], Kentaro Uesugi[2], Daisetsu Toh[1], Yasuhisa Sano[1], Makina Yabashi[2,3], Kazuto Yamauchi[1]
[1]Osaka University, [2]JASRI, [3]RIKEN SPring-8 Center

Scanning-imaging X-ray microscopy (SIXM) is an X-ray imaging system that utilizes optics akin to a "line-scan camera". We have developed an SIXM system using total-reflection advanced Kirkpatrick–Baez (AKB) mirrors to achieve high-throughput and achromatic multimodal X-ray images with high spatial resolution. We will report the details of the demonstrated imaging system, techniques for the resolution enhancement and prospects.

XOPTp-20

The Construction of TPS 31A2 Transmission X-ray Microscopy (TXM) Endstation

Bo-Yi Chen, Ming-Ying Hsu, Chien-Yu Lee, Ying-Shuo Tseng, Chao-Chih Chiu, Hsiu-Chien Chan, Shih-Ting Lo, Cheng-Yao Fu, Yu-Chun Chou, Yu-Shan Huang, Gung-Chian Yin
National Synchrotron Radiation Research Center

The Transmission X-ray Microscope (TXM) endstation at the Taiwan Photon Source (TPS) shares similar functionalities with the Projection X-ray Microscope (PXM) endstation. Both endstation serve as potential scientific tools for micro-computed tomography (micro-CT) and prove invaluable for non-destructive industrial inspections.

HEDSp 13:30-15:00

HEDSp-01

Ionization of argon ions K-shell in clusters heated by strong laser pulses with intensity up to 5×10^{21} W/cm^2.

Sergey N. Ryazantsev[1], Igor Skobelev[2], Maksim Sedov[2], Sergey Pikuz[1], Takafumi Asai[3,4], Masato Kanasaki[3], Tomoya Yamauchi[3], Satoshi Jinno[5,13], Masato Ota[6,7,14], Syunsuke Egashira[6,7], Kentaro Sakai[8,14], Takumi Minami[4,8], Yuki Abe[7,8], Atsushi Tokiyasu[9], Hideki Kohri[10], Yasuhiro Kuramitsu[7,8], Youichi Sakawa[7], Yasuhiro Miyasaka[4], Kotaro Kondo[4], Akira Kon[4], Akito Sagisaka[4], Koichi Ogura[4], Alexander S. Pirozhkov[4], Masaki Kando[4], Hiromitsu Kiriyama[4], Tetsuya Kawachi[4], Tatiana A. Pikuz[11], Evgeny D. Filippov[12], Ryosuke Kodama[7], Yuji Fukuda[4]
[1]HB11 Energy Holdings Pty Ltd., [2]Joint Institute for High Temperatures of RAS, [3]Graduate School of Maritime Sciences, Kobe University, [4]Kansai Institute for Photon Science (KPSI), National Institutes for Quantum Science and Technology (QST), [5]Nuclear Professional School, The University of Tokyo, [6]Graduate School of Science, Osaka University, [7]Institute of Laser Engineering, Osaka University, [8]Graduate School of Engineering, Osaka University, [9]Research Center for Electron Photon Science, Tohoku University, [10]Research Center for Nuclear Physics, Osaka University, [11]Institute for Open and Transdisciplinary Research Initiatives (OTRI), Osaka University, [12]Centro de Laseres Pulsados (CLPU), [13]Tono Geoscience Center, Japan Atomic Energy Agency (JAEA), [14]National Institute for Fusion Science

An X-ray spectroscopic approach is described to distinguish the effects of collisional processes and the incident optical field on the ionization state of the plasma generated in a gas cluster target irradiated with PW laser pulses.

HEDSp-02

Formation of a deep cylindrical cavity in LiF crystal by XFEL radiation

Sergey Makarov[2], Sergey Grigoryev[2], Tatiana Tatiana Pikuz[1], Nail Inogamov[3], Victor Khokhlov[3], Norimasa Ozaki[1], Masahiko Ishino[4], Masaharu Nishikino[4], Thanh-hung Dinh[4], Tetsuya Kawachi[4], Mikako Makita[5], Motoaki Nakatsutsumi[5], Thomas R. Preston[5], Karen Appel[5], Zuzana Konopkova[5], Valerio Cerantola[5], Erik Brambrink[5], Jan-Patrick Schwinkendorf[5], Istvan Mohacsi[5], Ludovic Rapp[6], Andrei Rode[6], Eugene Gamaly[6], Takahisa Shobu[7], Aki Tominaga[7], Hirotaka Nakamura[1], Ryosuke Kodama[1], Vasily Zhakhovsky[2], Sergey Pikuz[8], Ulf Zastrau[5]
[1]Osaka University, [2]Joint Institute for High Temperatures RAS, [3]Landau Institute for Theoretical Physics RAS, [4]Kansai Institute for Photon Science QST, [5]European XFEL, [6]Australian National University, [7]Material Science Research Center of Japan Atomic Energy Agency, [8]HB11 Energy Holdings

The damage of the LiF crystal after irradiating it with the EuFEL pulses at photon energy 9 keV was investigated for delivered doses in the range of 2 –850 kJ/cm^3 per pulse. Complexes analysis of the LiF sample showed the formation of the unexpected deep cylindrical cavity with a ratio diameter to a depth of more than 1: 100 at doses > 250 kJ/cm^3. The result is important for material processing.

HEDSp-03

Path for high-gain laser fusion with fast ignition scenario - FIREX-NEO (Numerical Experiment Optimization) project -

Yasuhiko Sentoku[1], Natsumi Iwata[1], Hideo Nagatomo[1], Tomoyuki Johzaki[2]
[1]Institute of Laser Engineering, The University of Osaka, [2]Graduate School of Advanced Science and Engineering, Hlroshima University

The latest status of integrated numerical simulation of ignition-class fast ignition fusion, including energy transport in core plasma and burning physics, and how to modeling them, will be presented.

HEDSp-04

Ab initio molecular dynamics simulations of CH_4 and H_2S mixture at planetary interior conditions

Daisuke Murayama[1], Satoshi Ohmura[2], Ryosuke Kodama[1,3], Norimasa Ozaki[1,3]
[1]Osaka University, [2]Hiroshima Institute of Technology, [3]Institute of Laser Engineering

CH_4 is one of the major constituents in icy giants, Uranus and Neptune, and H_2S was detected above the clouds in the atmosphere of Uranus. To obtain insights into the structural and chemical bonding properties, we calculated the pair-distribution functions and bond-overlap populations. Our findings could lead to elucidating the existence of H_2S in the atmosphere of the icy giants.

HEDSp-05

Analysis of Intense Laser Pulse Response of Graphene Using First-Principles Calculations

Ryotaro Kawai[1], Harihara Sudhan Kumar[1], Naofumi Ohnishi[1], Yasuhiro kuramitsu[2]
[1]Tohoku University, [2]Osaka University

The interaction between electromagnetic waves and electrons is investigated by first-principles calculations to predict the target state changes when intense laser irradiation of graphene produces high-energy ions.

HEDSp-06

Magnetic field amplification in layered hollow cylindrical targets

Jessa Jayne Miranda[1], Wilson Garcia[1], Masakatsu Murakami[2], Myles Allen Zosa[1]
[1]National Institute of Physics, University of the Philippines Diliman, [2]Institute of Laser Engineering, Osaka University

Micro-tube implosion (MTI) is a recently proposed scheme to generate strong magnetic field. In this study, we simulate MTI in uncoated and coated hollow cylindrical hydrogen targets using EPOCH. The results for the gold-coated target show that the largest B_{max} of ~113 times the initial seed is observed at 270 fs before it continuously decreases, reaching ~14 times the initial seed at 1000 fs.

Poster Program

Poster Session <Exhibition Hall A>

Wednesday, 24 April

HEDSp 13:30-15:00

HEDSp-07

Characteristics of laser-generated whistler waves propagating in high-density plasma

Masayasu Hata[1], Takayoshi Sano[2]
[1]National Institutes for Quantum Science and Technology, [2]Osaka University

Recently laser-generated whistler waves have attracted attention because they enable direct heating of high-density plasmas. We have investigated its characteristics by kinetic simulations up to date. As a result, we have found that strong stimulated Brillouin scattering inhibits the whistler wave propagation and therefore transmitted pulse duration is limited.

HEDSp-08

Particle-in-cell simulations of shockwaves in plasma

Jinyuan Dun[1,2], Justin Ray Angus[2], William Farmer[2], Alex Friedman[2], Vasily Geyko[2], Debojyoti Ghosh[2], Frank R Graziani[2], David P Grote[2], David Larson[2], Anthony J. Link[2], George B. Zimmerman[2], Shinsuke Fujioka[1]
[1]Institute of Laser Engineering, Osaka University, [2]Lawrence Livermore National Laboratory

In this research, we present fully kinetic results of shockwaves in plasmas ranging from Z=1 to Z=10. The simulations are performed using the energy- and charge-conserving particle-in-cell algorithm in PICNIC. In contrast to some theories for shocks in plasmas with Z>5, where the classical electron viscosity can exceed that of the ions, the electron heating in the viscous sublayer is insignificant compared to that for the ions for all values of Z considered.

HEDSp-09

Femtosecond X-ray Imaging of Ultrafast Dislocations in Shocked Diamond

K. Katagiri[1,2,3,4,5], T. Pikuz[6], L. Fang[1,2,3], B. Albertazzi[7], S. Egashira[5], Y. Inubushi[8,9], G. Kamimura[4], R. Kodama[4,5,6], M. Koenig[4,7], B. Kozioziemski[10], G. Masaoka[4], K. Miyanishi[9], H. Nakamura[4], M. Ota[5], G. Rigon[11], Y. Sakawa[5], T. Sano[5], F. Schoofs[12], Z. J. Smith[13], K. Sueda[9], T. Togashi[8,9], T. Vinci[7], Y. Wang[1,2,3], M. Yabashi[8,9], T. Yabuuchi[8,9], L. E. Dresselhaus-Marais[1,2,3], N. Ozaki[4,5]
[1]Department of Materials Science & Engineering, Stanford University, [2]SLAC National Accelerator Laboratory, [3]PULSE Institute, Stanford University, [4]Graduate School of Engineering, Osaka University, [5]Institute of Laser Engineering, Osaka University, [6]Institute for Open and Transdisciplinary Research in Initiatives, Osaka University, [7]LULI, CNRS, CEA, Ecole Polytechnique, UPMC, Univ Paris 06: Sorbonne Universites, Institut Polytechnique de Paris, [8]Japan Synchrotron Radiation Research Institute, [9]RIKEN SPring-8 Center, [10]Lawrence Livermore National Laboratory, [11]Department of Physics, Nagoya University, [12]United Kingdom Atomic Energy Authority, Culham Science Centre, [13]Department of Applied Physics, Stanford University

The maximum speed of dislocation motions in a crystal was thought to be limited by the transverse sound speed of the crystal. Theoretical studies, however, indicate that the dislocations can move faster than transverse sound speed if they are created at such high speeds.

HEDSp-10

In-situ X-ray Diffraction of Additively Manufactured Eutectic High Entropy Alloy under Shock Compression and Release

A. Hari[1,2,3], K. Katagiri[1,2,3], S. Irvine[2,3,4], L. Madril[1,2,3], A. Amouretti[5], Y. Inubushi[6,7], R. Kodama[5,8], K. Miyanishi[7], H. Nakamura[5], N. Ozaki[5,8], J. E. Ren[9], Y. Seto[10], K. Sueda[7], S. Takagi[11], Y. Umeda[12], M. Yabashi[6,7], T. Yabuuchi[6,7], W. Yang[9], Y. Vohra[13], W. Chen[9], L. Dresselhaus-Marais[1,2,3]
[1]Department of Materials Science and Engineering, Stanford University, [2]SLAC National Accelerator Laboratory, [3]PULSE Institute, Stanford University, [4]Department of Applied Physics, Stanford University, [5]Graduate School of Engineering, Osaka University, [6]Japan Synchrotron Radiation Research Institute, [7]RIKEN SPring-8 Center, [8]Institute of Laser Engineering, Osaka University, [9]Department of Mechanical and Industrial Engineering, University of Massachusetts, [10]Graduate School of Science, Osaka Metropolitan University, [11]Earth and Planets Laboratory, Carnegie Institution for Science, [12]Institute for Integrated Radiation and Nuclear Science, Kyoto University, [13]Department of Physics, University of Alabama at Birmingham

Eutectic high entropy alloy (EHEA) $AlCoCrFeNi_{2.1}$ additively manufactured through laser powder bed fusion has both high strength and ductility due to its far-from-equilibrium, dual-phase nanolamellar structure consisting of both fcc and bcc phases.

HEDSp-11

Experimental platforms for laser-based HED science at the SACLA X-ray free-electron laser facility

Kohei Miyanishi[1], T. Yabuuchi[1,2], Y. Inubushi[1,2], K. Sueda[1], T. Togashi[1,2], H. Tomizawa[1,2], M. Yabashi[1,2]
[1]RIKEN SPring-8 Center, [2]Japan Synchrotron Radiation Research Institute

X-ray Free Electron Lasers (XFELs) are revolutionizing various scientific domains, including high-energy-density (HED) science, thanks to their unparalleled brilliance, ultrashort pulse durations, and high spatial coherence. These features enable unprecedented observations and experiments.

LEDIAp 13:30-15:00

LEDIAp-01

Demonstration of high aspect ratio etching by Ni mask process for μ-LED monolithic integration

Haruto Fujii, Takeyoshi Onuma, Tomohiro Yamaguchi, Tohru Honda
Kogakuin University

Monolithically integrated μ-LED displays were investigated. The Ni mask process, in which SiO_2 and Ni were deposited on the GaN template, realized a high aspect ratio etching without changing etching conditions.

LEDIAp-02

Current Transport and Photodetection in Contacts of Graphene Quantum Dot and GaN

Bhishma Pandit, Daeju Kim, Jaehee Cho
Jeonbuk National University

The contacts of graphene quantum dots (GQDs) formed on a n-type GaN semiconductor were investigated to provide understanding of the current transport mechanism between GQDs and semiconductor materials.

LEDIAp-03

Investigation of sidewall-surface recombination using InGaN based blue and red micro-LEDs

Heajeong Cheong[1,2,3], Jeong-Hwan Park[3], Markus Pristovsek[2], Woong Kown[1], Hiroshi Amano[1,2,3,4]
[1]Graduate School of Engineering, Nagoya University, [2]CIRFE, Institute of Materials and Systems for Sustainability (IMaSS), Nagoya University, [3]Venture Business Laboratory, Deep Tech Serial Innovation Center, Nagoya University, [4]Institute for Advanced Research (IAR), Nagoya University

As for the red emission source in μLEDs display system, AlGaInP-based and InGaN-based μLEDs are competing. Here, we reveal that the detailed mechanism why the sidewall-surface recombination occurs, and which parameter determines the carrier loss through a comparison between InGaN-based blue and red μLEDs, which have not been covered in any other reports to date.

LEDIAp-04

High-efficiency InGaN tunnel-junction laser diode

Sung-Un Kim, Dae-Young Um, Jeong-Kyun Oh, Vignesh Veeramuthu, Cheul-Ro Lee, Yong-Ho Ra
Jeonbuk National University

We fabricated a 5x5μm^2 sized GaN nanorod photonic crystal laser diode (LD). This LD demonstrated a turn-on voltage of ~2.5 V and lasing wavelength at ~502 nm with a FWHM of ~1 nm.

LEDIAp-05

Improvement of Optical Isolation in GaN-based Integrated Micro-LEDs

Julian Keller, Haruto Fujii, Yamato Yamazaki, Takeyoshi Onuma, Tomohiro Yamaguchi, Tohru Honda
Kogakuin University

Optical isolation was investigated to realize monolithically integrated micro-LED displays. Reductions of crosstalk and Halo effect, which are issues for micro-LEDs, were accomplished by applying titanium-based black pigment coating to the front and back surfaces.

LEDIAp-06

Basic properties of heavily Ge-doped GaN and AlGaN prepared by pulsed sputtering

Aiko Naito, Kohei Ueno, Hiroshi Fujioka
The University of Tokyo

We grew heavily Ge-doped GaN and AlGaN by pulsed sputtering and confirmed the formation of highly degenerate GaN and AlGaN. We have achieved a record-large optical bandgap of 3.84 eV for GaN.

LEDIAp-07

Evaluation of neutron detection characteristics of BGaN detector using long wavelength neutron beam

T Sakurai[1], K. Ando[1], R. Kudo[1], S. Kawasaki[2], K. Takagi[3], J. Nishizawa[3], M. Hino[4], Y. Honda[5], H. Amano[5], Y. Inoue[1], T. Aoki[3], T. Nakano[1,3]
[1]Graduate School of Integrated Science and Technology, Shizuoka University, [2]Graduate School of Integrated Science and Technology, Nagoya University, [3]Research Institute of Electronics, Shizuoka University, [4]Institute for Integrated Radiation and Nuclear Science, Kyoto University, [5]Institute of Materials and System for Sustainability, Nagoya University

In this study, BGaN devices with increased B content compared to conventional devices were used to evaluate neutron detection characteristics using a long wavelength neutron beam at port C3-1-2 (MINE-1) of Japan Research Reactor (JRR-3). The resulting evaluation using a long-wavelength neutron beam shows that a detection signal peak originating from neutron capture has been obtained, allowing a detailed study of neutron detection in BGaN devices.

LEDIAp-08

Separation of AlGaN-based LED structures from AlN/sapphire template by photoelectrochemical etching

Yoshio Honda[1], Yuta Furusawa[1], Ryoko Tsukammoto[1], Yoshiki Saito[2], Koji Okuno[2], Shinya Boyama[2], Atsushi Miyazaki[2], Maki Kushimoto[1], Hiroshi Amano[1]
[1]Nagoya University, [2]Toyoda Gosei

The study aims to enhance UVLEDs' light extraction efficiency by using photoelectrochemical (PEC) etching to detach the LED structure from AlN/sapphire substrates. Employing a sacrificial layer of low Al composition n-AlGaN and a high-pressure mercury vapor lamp, the method achieved detachment up to size of 60 um with etching rates exceeding 30um/h.

LEDIAp-09

Enhancing carrier transport and capture with a good current spreading characteristic via graphene quantum dots in InGaN/GaN multiple-quantum-well light emitting diodes

Shih-Wei Feng[1], S. K. Fung[1], C. Y. Tsai[1], J. L. Shen[2], H. C. Wang[3], J. Han[4]
[1]Department of Applied Physics, National University of Kaohsiung, [2]Department of Physics and Center for Nanotechnology, Chung Yuan Christian University, [3]Department of Mechanical Engineering and Advanced Institute of Manufacturing with High-tech Innovations, National Chung Cheng University, [4]Department of Electrical Engineering, Yale University

InGaN-based LEDs with graphene quantum dots (GQDs) are studied with time-resolved electroluminescence measurements. The shorter response, rise, delay, and recombination times of the LEDs with GQDs provide more efficient carrier injection, transport, relaxation, and recombination.

Poster Session <Exhibition Hall A>

Wednesday, 24 April

LEDIAp 13:30-15:00

LEDIAp-10

Electronic structures of κ-Ga_2O_3/Al_2O_3 superlattices

Takeshi Nishimura[1], Takahiro Kawamura[1], Toru Akiyama[1], Yoshihiro Kangawa[2]
[1]Mie University, [2]Kyushu University

First-principles calculations were used to investigate the superlattice periodic thickness and lattice strain dependences on the electronic structures of κ-Ga_2O_3/Al_2O_3 superlattices. The bandgap and band offset were evaluated by calculating the band structures and density of states.

LEDIAp-11

First-Principles Calculations of Bandgap Control of κ-Ga_2O_3 by Uniaxial Strain

Takuma Yamashita[1], Takahiro Kawamura[1], Toru Akiyama[1], Yoshihiro Kangawa[2]
[1]Mie University, [2]Kyushu University

The effect of strain on the band structure of κ-Ga_2O_3 was investigated using first-principles calculations. The results show that the bandgap increased or decreased depending on strain.

LEDIAp-12

Fabrication and Evaluation of Low-B Composition and High Crystallinity BGaN Neutron Detectors for Nuclear Reactor

Ryohei Kubo[1], Tatsuhiro Sakurai[1], Eito Kokubo[2], Seiya Kawasaki[2], Katsuyuki Takagi[3], Junichi Nishizawa[3], Tetsuichi Kishishita[4], Yoshinori Sakurai[5], Hiroshi Yashima[5], Takahiro Makino[6], Takeshi Ohshima[6], Yoshio Honda[7], Hiroshi Amano[7], Yoku Inoue[1], Toru Aoki[3], Takayuki Nakano[1,3]
[1]Graduate School of Integrated Science and Technology, Shizuoka University, [2]Graduate School of Integrated Science and Technology, Nagoya University, [3]Research Institute of Electronics, Shizuoka University, [4]High Energy Accelerator Research Organization (KEK), [5]Institute for Integrated Radiation and Nuclear Science, Kyoto University, [6]National Institutes for Quantum Science and Technology (QST), [7]Institute of Materials and System for Sustainability, Nagoya University

BGaN detectors, which are expected to be used for nuclear instrumentation system, demand high temperature and high radiation tolerance. In this study, BGaN with low B composition and high crystallinity were used to improve the characteristics for high tolerance BGaN detectors. The improved detection properties were confirmed in devices using BGaN with a BN mole fraction of 0.45%.

LEDIAp-13

High temperature and high speed growth of GaN by Cl_2-based HVPE

Keito Shiroma, Xingxing Pan, Kota Nemoto, Hisashi Murakami
Tokyo University of Agriculture and Technology

Fairly high temperature growth of GaN using Cl_2-based HVPE using GaCl was investigated on N-polar GaN. Compared with the distribution of tilt angles of dislocations in conventional HVPE, it was found that the number of dislocations with large tilt angles increased in fairly high temperature HVPE. These results suggest that HVPE of GaN above 1300 °C is essential for reducing dislocations for optoelectronic device applications.

LEDIAp-14

Investigation of conversion efficiency of different Ga oxidants in OVPE-GaN growth

Tsubasa Nakazono[1], Shigeyoshi Usami[1], Masayuki Imanishi[1], Tomoaki Sumi[2], Junichi Takino[2], Yoshio Okayama[2], Mihoko Maruyama[2], Masashi Yoshimura[3], Masahiko Hata[4], Masashi Isemura[5], Yusuke Mori[1]
[1]Grad. School of Eng., Osaka University, Osaka, Japan, [2]Panasonic Holdings Corporation, Osaka, Japan, [3]ILE, Osaka University, Osaka, Japan, [4]Itochu Plastics Incorporated, Tokyo, Japan, [5]Sosho-Ohshin Incorporated, Osaka, Japan

We investigated the behavior of N_2O as the gallium oxidants, which has not been explored before, to achieve high partial pressure of Ga_2O for the high-speed OVPE-GaN (gallium nitride) growth.

LEDIAp-15

Vacancies in III-Nitrides (I): Formation under Reconstructed Surfaces

K. Tateyama[1], Y. Kangawa[1,2], A. Kusaba[1,2], T. Kawamura[3]
[1]Interdisciplinary Graduate School of Engineering Sciences, [2]Research Institute for Applied Mechanics, Kyushu University, [3]Graduate School of Engineering, Mie University

In the CVD growth, vacancies are incorporated from the growth surface. In this presentation, we discuss the stability of them in sub-surface layers under surface reconstructions.

LEDIAp-16

Vacancies in III-Nitrides (II): Diffusion near Hetero Interfaces

R. Shimauchi[1], Y. Kangawa[1,2], A. Kusaba[1,2]
[1]Interdisciplinary Graduate School of Engineering Sciences, [2]Research Institute for Applied Mechanics, Kyushu University

Atomically flat heterointerfaces are required to fabricate high-brightness and long-lifetime optical devices such as LEDs and LDs. In this presentation, the deterioration mechanism of sharp heterointerfaces due to vacancy diffusion is discussed.

LEDIAp-17

Homoepitaxial regrowth of AlGaN on chemically mechanically polished AlGaN templates and its application to UV B laser diodes

R. Yamada[1], R. Kondo[1], T. Nishibayashi[1], Y. Imoto[1], T. Saito[1], S. Maruyama[1], R. Miyake[1], Y. Sasaki[1], S. Iwayama[1], M. Iwaya[1], T. Takeuchi[1], S. Kamiyama[1], H. Miyake[2]
[1]Meijo Univ., [2]Mie Univ.

A chemically mechanically polishing of AlGaN was investigated. AlGaN was re grown on the polished templates and applied to UV B laser diodes. This method had a clear effect of reducing hillock and successfully achieved oscillation at RT.

LEDIAp-18

RF-MBE growth of AlGaN on low-dislocation-density AlN template substrates

R. Kasai[1], R. Tanaka[1], M. Deura[2], M. Urushiyama[3], R. Akaike[3], T. Nakamura[3,4]
[1]Col. of Sci. & Eng., [2]R-GIRO, Ritsumeikan Univ., [3]Grad. Sch. of Eng., [4]MRPCO, Mie Univ.

We investigated growth temperature dependence of crystal properties of AlGaN films grown on low-dislocation-density AlN template substrates using RF-MBE. Crystal coherency improved at higher temperature while the Al content was almost constant.

OWPTp 13:30-15:00

OWPTp-01

Successive Positioning and Attitude Determination of Solar Cell by Differential Absorption Image Sensor for OWPT

Kaoru Asaba, Tomoyuki Miyamoto
Tokyo Institute of Technology

In an OWPT system, the position, and attitude of the photovoltaic device should be tracked from the light source. The authors proposed a robust PV detection, positioning, and attitude determination method using a differential absorption image combined with the stereo imagery technique. This study reports the achievements of its successive positioning and attitude determination.

OWPTp-02

Improvement of communication quality by adaptive optics using Convolutional Neural Network

Monami Teranishi, Kayo Ogawa
Japan Women's University

In this study, we investigate the improvement of communication quality by adaptive optics using convolutional neural networks (CNN). The CNN predicts turbulent phase distribution from intensity distribution images after atmospheric turbulence. This conjugate image was then used as a compensation filter. The results show that SI is reduced, BER characteristics are improved, and communication quality is improved.

OWPTp-03

Design and Analysis of Optical Transmitter and Receiver Modules for Inter-Satellite Link Application

Kuan-Ming Cheng[1], Tsu-Hsin Wu[1], TengYao Yang[1], Chun-Yen ChLin[1], Lan-Yin Chen[1], Yu-Ting Lai[1], Chien-Hung Yeh[1], Ching-Wei Chen[2], Liang-Tang Chen[2]
[1]Feng Chia University, [2]Taiwan Space Agency (TASA)

In this work, an optical communication terminal (OCT) with corresponding transmitter (Tx) and receiver (Rx) modules is designed for optical inter-satellite link (OISL) in space. Here, 1.25 to 10 Gbit/s on-off keying (OOK) modulation rates are reached for OISL connection. To reach free space transmission length of >2500 km, the corresponding power budget of OCT is executed and analyzed.

OWPTp-04

Power over Fiber Based on Wavelength Division Multiplexing in Multimode Fibers

Yao Guo[1], Yuemei Li[1], Ziyang Xiao[2], Dehua Chen[1], Zhiguo Zhang[1]
[1]State Key Lab of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, [2]State Grid Jiangxi Information and Telecommunication Branch

A power-over-fiber scheme based on wavelength division multiplexing in MMFs is proposed, and up to 23.57 W of power transmission with good beam transmission quality is implemented, which is 6.6 times compared to SMF.

OWPTp-05

Efficient Power Supply Sequencing Algorithm and Experimental Validation for Numerous Small IoT terminals using OWPT

Takuto Mizutani, Tomoyuki Miyamoto
Tokyo Institute of Technology

The IoT utilizes a vast number of terminals, and OWPT as a power supply method will become the most important method for stable continuous operation of all terminals. For efficient configuration operation of the system, numerical simulations was re performed for establishment of a power supply order algorithm. As a result, many terminals can be operated stably by switching the power supply order when fully charged with sufficient OWPT supply power.

OWPTp-06

Beam Shape Control System for Wide Angle Oblique Beam Irradiation in Optical Wireless Power Transmission

Kenta Moriyama, Kaoru Asaba, Tomoyuki Miyamoto
Tokyo Institute of Technology

We used a lens system composed of two pairs of cylindrical lenses for beam shaping and constructed the numerical model that connects the lens system's parameter and output beam characteristics. With this model, numerical control of the beam shape is confirmed.

OWPTp-07

Extending the Flight Range of OWPT Dynamic Charged Micro-drones Based on Effective Use of Optical Beams

Tomoya Watamura, Takuo Nagasaka, Tomoyuki Miyamoto
Tokyo Institute of Technology

For unlimited flight time of micro-drones, dynamic charging by optical wireless power transmission is promising. By analyzing the effect of beam shape on the power characteristics and optimizing the lens configuration, a vertical flight of up to 95 cm was achieved with a 30 W VCSEL array output.

OWPTp-08

Laser irradiation position dependence of conversion efficiency of CIGS solar cells

Shuntaro Fujii[1], Shunsuke Shibui[1], Moeka Chiba[1], Hironori Komaki[2], Hiroaki Nakamura[2], Hiroshi Tomita[2], Takato Ishiuchi[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Idemitsu Kosan Co., Ltd.

We investigated the conversion efficiency of the CIGS cell with two subcells under 1064 nm laser irradiation, changing the laser beam position. The beam position control was found to be significant for this CIGS cell.

OWPTp-09

Improvement of Power Conversion Efficiency under High Intensity Laser Irradiation Using Thick Gold Plating

Takaya Oshimo[1], Yuga Motomura[1], Yukiko Suzuki[2], Natsuha Ochiai[2], Kazuto Kashiwakura[2], Youhei Toriumi[2], Kensuke Nishioka[1], Masakazu Arai[1]
[1]Univ. of Miyazaki, [2]NTT Space Environment and Energy Laboratories

We characterized InGaAsP solar cell devices using electrolytic gold plating as surface electrode under 1064 nm laser irradiation. The increase in the electrode thickness was confirmed to reduce the deterioration of the fill factor and improve the power conversion efficiency under high laser power irradiation.

Poster Session <Exhibition Hall A>

Thursday, 25 April

ALPSp2 10:30-12:00

ALPSp2-01

Transparent Ga_2O_3 and $Gd_3Ga_5O_{12}$ thick films prepared by laser-assisted chemical vapor deposition and their optical properties

Terumasa Oga, Akihiko Ito
Yokohama National University

Ga_2O_3 and $Gd_3Ga_5O_{12}$ transparent thick films were prepared on c-cut sapphire and $Y_3Al_5O_{12}$ single crystal substrates using laser-assisted chemical vapor deposition method, respectively.

ALPSp2-02

Highly adaptive dual-purpose fiber laser based on manganese dioxide saturable absorber

Xinhe Dou, Zhiguo Lv
Inner Mongolia University

We explored a novel MnO_2 ultrafast photonic device, and used it as a modulation device to achieve Q-switched pulsed operation in a wide input power range and a ultrashort pulse generation with 85.7 dB SNR.

ALPSp2-03

Pulse evolution using nonlinear polarization evolution in polarization maintaining fiber

Xiang Li, Zhiguo Lv
Inner Mongolia University

We have realized the bound state phenomenon at 1.5μm for the first time through the fully polarization-maintaining nonlinear polarization evolution technique. By changing the distance of pulse evolution, the phenomenon of noise-like is also realized.

ALPSp2-04

Ultrafast optical nonlinearity in Hydrazone

Sharafudeen Kaniyarakkal Naduvil Valappil[1], Vijayakumar S. Nair[2], Shiju Edappadikkunnummal[3]
[1]Kuwait College of Science and Technology, [2]NSSC Pandalam, Kerala University, [3]Chinmaya Vishwavidyapeeth Institute of Science and Technology

We have measured the femtosecond third-order nonlinear optical response $\chi^{(3)}$ in a novel class of π-conjugated dicarbohydrazone using z-scan and optical limiting techniques. In off-resonance conditions at 800 nm we found three photon absorption coefficients and nonlinear refraction coefficients values which are significant. This material is an excellent candidate for nonlinear optical devices in the lower optical frequency range.

ALPSp2-05

Luminescence properties of Ce^{3+}-doped lutetium silicate thick films prepared using laser-assisted chemical vapor deposition

Airi Shikichi, Akihiko Ito
Yokohama National University

We prepared Ce^{3+}-doped lutetium silicate films on quartz glass using laser-assisted chemical vapor deposition and investigated its microstructure and luminescence properties.

ALPSp2-06

SESAM mode-locked Tm,Ho:Ca(Gd,Y)AlO_4 laser at 2130 nm

Zhang-Lang Lin[1,2], Valentin Petrov[1], Uwe Griebner[1], Ge Zhang[2], Peixiong Zhang[3], Zhen Li[3], Zhenqiang Chen[3], Xavier Mateos[4], Pavel Loiko[5], Weidong Chen[1,2]
[1]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [2]Fujian Institute of Research on the Structure of Matter, [3]Jinan University, [4]Universitat Rovira i Virgili, [5]Université de Caen

We demonstrate a SESAM mode-locked Tm,Ho:Ca(Gd,Y)AlO4 laser delivering soliton pulses as short as 114 fs at 2130 nm with an average output power of 142 mW at a pulse repetition rate of ~80.5 MHz.

ALPSp2-07

Optimization of Effective Nonlinearity in Trigonal $BaGa_2GeS_6$

Kentaro Miyata[1], Kiyoshi Kato[2,3], Nobuhiro Umemura[2], Valentin Petrov[4]
[1]RIKEN, [2]Chitose Institute of Science and Technology, [3]Okamoto Optics, Inc, [4]Max-Born-Institute for Nonlinear Optics and Ultrafast Spectroscopy

The optimum propagation directions for maximum effective nonlinearity in the trigonal $BaGa_2GeS_6$ nonlinear crystal are determined based on magnitude and relative sign of its nonlinear coefficients with proper octant assignment.

ALPSp2-08

Synthesis and emission properties of fast near-infrared phosphor Eu:$CaSc_2O_4$

Shohei Kodama, Tomoki Saito, Ikuo Yanase, Hiroaki Takeda
Saitama University

Fast near-infrared phosphor Eu:$CaSc_2O_4$ was synthesized and evaluated its emission properties. Eu:$CaSc_2O_4$ exhibited the broad near-infrared emission around 750 nm with the outstandingly fast decay of 3.10 ns (19%) and 16.3 ns (81%).

ALPSp2-09

Optical and Thermo-Mechanical Properties of Vanadium Dioxide Thin Films with Different Tungsten Doped Contents

Chuen-Lin Tien, Min-Yang Lu, Chun-Yu Chiang
Feng Chia University

Tungsten-doped vanadium dioxide thin films were deposited by electron beam evaporation with ion beam-assisted deposition. The optical and thermo-mechanical properties of VO_2 films were investigated. The results show the CTE and biaxial modulus are obtained.

ALPSp2-10

Oscillation of 122 nm laser by means of TCE Ne-like Al ion scheme

Yuito Nishii[1], Keishin Watanabe[1], Tomoyuki Johzaki[1,2], Jiahao Wang[1], Kotaro Yamasaki[1], Shiniti Namba[1]
[1]Hiroshima University, [2]Osaka University

We have developed a 122 nm vacuum ultraviolet (VUV) laser oscillation by using the transient electron collisional excitation scheme(TCE) scheme in aluminium laser produced plasmas.

ALPSp2-11

Measurement of Sn ion energy spectrum and estimation of Sn cloud density distribution for lifetime improvement of collector mirror in EUV light source

Yoshiyuki Honda[1], Shinji Nagai[1], Tomoyoshi Toida[1], Hirokazu Hosoda[1], Takeru Niinuma[2], Masaki Kume[2], Hiroki Morita[2], Takeshi Higashiguchi[2]
[1]Gigaphoton Inc., [2]Utsunomiya Univ.

We measured the Sn ion energy spectrum and estimated of Sn cloud density distribution. It was estimated that high density Sn remained in the Sn cloud regardless of Sn DL size or Sn cloud size.

ALPSp2-12

Characteristics of high-energy ion debris from a laser-produced Gd plasma B-EUV source

Takeru Niinuma[1], Masaki Kume[1], Tsukasa Sugiura[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

A laser-produced Gd plasma has been proposed as a next generation of lithography light source (B-EUV source). We observed the charge-separated energy spectra and the angular distribution of high-energy ion debris from a B-EUV source.

ALPSp2-13

EUV conversion efficiency of multiple laser irradiation

Tsukasa Sugiura[1], Hayato Yazawa[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

The conversion efficiency of EUV was measured when irradiating each of the lasers from one to five lasers. When multiple lasers were irradiated, the conversion efficiency increased more than only one laser irradiation.

ALPSp2-14

Characteristics of EUV and energetic ion emission by a double-pulse laser scheme

Hayato Yazawa[1], Tsukasa Sugiura[1], Hiroki Morita[1], Shinichi Namba[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]Hiroshima University

We have measured energetic ion and EUV properties with a new irradiation scheme. This scheme achieved spatial separation of energetic ions and EUV, and spectral purity was improved 40% compared to single pulse laser scheme.

ALPSp2-15

Development of mid-infrared laser by optical parametric amplification using near-infrared laser as pumping

Ryoma Sato[1], Ayaka Ogiwara[1], Hiroki Morita[1], Kazuyuki Sakaue[2], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]The University of Tokyo

We develop a 3-μm laser through an OPA system converted from a laser of 1-μm wavelength. The output power was 10 mW. The central wavelength of the idler light was 3070 nm.

ALPSp2-16

Measurement of electron energy spectra in BISER harmonic radiation-Xe gas interaction

Shinichi Namba[1], A.S Pirozhkov[2], Masaki Kando[2]
[1]Hiroshima University, [2]National Institutes for Quantum Science and Technology

Xe atom was irradiated with BISER harmonic radiation emitted from a relativistic laser plasma. Photoelectron and Auger electron spectra attributed to Xe 4d innershell ionization was measured by a magnetic bottle electron spectrometer.

ALPSp2-17

Generation of high-order harmonics by using long interaction He gas tube

Shinichi Namba[1], Jozsef Seres[2], E. Seres[2], Carles Serrat[3], D.H. Dinh[4], Noboru Hasegawa[4], Makoto Ishino[4], T. Niinuma[4,5], M. Kume[5], Kotaro Yamasaki[1], Takeshi Higashiguchi[5]
[1]Hiroshima University, [2]Vienna University of Technology, [3]Polytechnic University of Catalonia, [4]National Institutes for Quantum Science and Technology, [5]Utsunomiya University

High-order harmonics around 13.5 nm was generated by interaction of long He gas medium with TiS laser pulse. The spectral shift and split were observed by spectroscopic measurements.

ALPSp2-18

Towards the Development of High-Power EUV Light Source Based on Observation of Laser-Produced Sn Plasma Dynamics

Daisuke Nakamura[1], Yiming Pan[2], Kentaro Tomita[2], Yukihiko Yamagata[1], Kazunori Koga[1], Hakaru Mizoguchi[1], Masaharu Shiratani[1]
[1]Kyushu University, [2]Hokkaido University

For the development of high-power EUV light sources by laser-produced Sn plasma, we have visualized Sn ion and neutral atom distributions. Furthermore, the plasma dynamics were successfully observed by the collective Thomson scattering technique.

ALPSp2-19

Experimental study on properties of relativistic Coulomb fields

Masato Ota[1,2,3], Koichi Kan[4,5], Youwei Wang[1,6], Verdad C Agulto[1], Yasunobu Arikawa[1], Makoto R. Asakawa[6], Youichi Sakawa[1], Tatsunosuke Matsui[7], Makoto Nakajima[1]
[1]Institute of Laser Engineering, Osaka University, [2]National Institute for Fusion Science, [3]The Graduate University for Advanced Studies, SOKENDAI, [4]Institute of Scientific and Industrial Research (SANKEN), Osaka University, [5]National Institutes for Quantum Science and Technology, [6]Faculty of Engineering Science, Kansai University, [7]Department of Electrical and Electronic Engineering, Mie University

Properties of relativistic Coulomb fields around a high-energy electron beam were studied by electro-optic sampling with echelon-based single-shot measurement. The application of the ultrafast electric-field diagnostics will be a platform of the high-energy physics.

Poster Session <Exhibition Hall A>

Thursday, 25 April

ALPSp2 10:30-12:00

ALPSp2-20

Highly efficient THz wave using chaos supremacy

Fumiyoshi Kuwashima[1], Mona Jarrahi[2], Semih Cakmakyapan[2], Kenji Wada[3], Masanobu Haraguchi[4], Yuki Kawakami[5], Takeshi Moriyasu[6], Osamu Morikawa[7], Kazuyoshi Kurihara[8], Hideaki Kitahara[9], Takashi Furuya[9], Makoto Nakajima[10], Masahiko Tani[9]
[1]Fukui Univ. of Tech., [2]University of California Los Angeles, [3]Osaka Metropolitan University, [4]Tokushima University, [5]National Institute of Technology (KOSEN), Fukui College, [6]Faculty of Engineering, University of Fukui, [7]Chair of Liberal Arts, Japan Coast Guard Academy, [8]School of Education., University. of Fukui, [9]Research Center for Development of Far-Infrared Region, University of Fukui, [10]Osaka Univ.

Highly efficient THz wave using chaotically oscillating laser diode is investigated. Compared it to conventional continuous wave multi-mode semiconductor laser excitation system, about ten times output power is increased because of chaos supremacy.

ALPSp2-21

Enhancements of UV Emissions from Ga_2O_3 Nano-Hemispherical Structures by Surface Plasmon Resonance

Kai Funato, Shogo Tokimori, Tomoya Kubota, Tetsuya Matsuyama, Kenji Wada, Koichi Okamoto
Osaka Metropolitan University

We have developed Ga_2O_3 nano-hemisphere (NH) to enhance photoluminescence (PL) in the ultraviolet region and increased the PL intensities by optimizing annealing conditions. Furthermore, the surface plasmon resonance with Al film enhanced the UV emissions.

ALPSp2-22

Photoluminescence Enhancement from CdSe/ZnS Quantum Dots through Surface Plasmon Resonance using Ag Nanostructures Fabricated by Thermal Annealing

Tomohiko Niwa, Tatsuya Tanoue, Tetsuya Matsuyama, Kenji Wada, Koichi Okamoto
Osaka Metropolitan University

We achieved photoluminescence (PL) enhancement from CdSe/ZnS Quantum Dots (QDs) by using Surface Plasmon Resonance (SPR) of Ag nanostructures fabricated by thermal annealing, and show the potential to realize highly efficient RGB.

ALPSp2-23

Multicolor 3D metasurface holography by time-division method

Junpei Beppu, Tamaki Onozawa, Masakazu Yamaguchi, Kentaro Iwami
Tokyo University of Agriculture and Technology

This study achieved the multicolor 3D metasurface holography, using a time-division method. Holograms of red, green, and blue channels of tha target image were fabricated and overlayed at 5.19 fps.

ALPSp2-24

Polarization Sensitive Photoresponse in a Gap-Plasmon-Enhanced NbN Superconducting Photon Detector

Feng-Yang Tsai[1,2], Jing-Wei Yang[1], Jia-Wern Chen[1], Yu-Jung Lu[1,2]
[1]Academia Sinica, [2]National Taiwan University

We designed and demonstrated a polarization-sensitive plasmonic superconducting single-photon detector (SSPD) using NbN superconducting microwire coupled with silver nanorod nanoresonators. The plasmonic SSPD exhibit a nonlinear photoresponse in the visible range operated at 13 K via gap plasmon resonance.

ALPSp2-25

Room-Temperature Lasing from Quasi-2D Ruddlesden-Popper Perovskites Coupled with Plasmonic Lattices

Lin-Chyn Yuan[1,2], Xing-Hao Lee[1,2], Jia-Wern Chen[2], Chiung-Han Chen[3], Yen-Yu Wang[2], Chih-Wei Chu[1], Yang-Fang Chen[1], Chu-Chen Chueh[3], Yu-Jung Lu[1,2]
[1]Department of Physics, National Taiwan University, Taipei, Taiwan, [2]Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan, [3]Department of Chemical Engineering, National Taiwan University, Taipei 10617, Taiwan

In this work, we demonstrated single mode lasing in quasi-2D Ruddlesden-Popper perovskites ($PEA_2Cs_{n-1}PbnBr_{3n+1}$, n=5) combined with Al-based plasmonic lattices at room temperature by the hybrid plasmonic surface lattice resonance to achieve population inversion.

ALPSp2-26

Laser-mediated nanoparticle delivery to achieve cutaneous siRNA targeting for mitigating psoriasiform inflammation

Jia-You Fang[1], Woan-Ruoh Lee[2], Chien-Yu Lin[1]
[1]Chang Gung University, [2]Taipei Medical University

Herein, we developed a delivery system for siRNA based on poly(lactic-co-glycolic acid) (PLGA) nanoparticles and combined this system with ablative laser to promote skin permeation. The siRNA absorption enhancement was compared by two laser modalities: fractional CO_2 laser and fully-ablative Er:YAG laser. Topical application of fractional laser-assisted nanoparticle delivery on mice resulted in 56% of IL-6 knockdown.

ALPSp2-27

Single fiber endoscopic imaging based on differential ghost imaging

Toshitaka Wakayama[1], Yudai Higuchi[1], Rikuto Kondo[1], Yasuhiro Mizutani[2], Takeshi Higashiguchi[3]
[1]Saitama Medical University, [2]Osaka University, [3]Utsunomiya University

We demonstrate a single fiber endoscopic imaging based on differential ghost imaging. We achieved an endoscopic fiber imaging with a spatial resolution of 0.05 mm using 30,000 speckle patterns recorded.

ALPSp2-28

Laser-assisted nanoparticle permeation for promoting the skin absorption and penetration depth of retinoic acid

Tsong-Long Hwang[1], Woan-Ruoh Lee[2], Pei-Chi Lo[1]
[1]Chang Gung University of Science and Technology, [2]Taipei Medical University

Two delivery approaches, namely nanoparticles and laser ablation, were combined to improve RA's absorption efficacy and safety. The nanoparticle absorption enhancement by the lasers was compared between full-ablative (Er:YAG) and fractional (CO_2) modalities. Our results indicated that the laser-mediated nanoparticle delivery provided an efficient and safe use for treating photoaging.

ALPSp2-29

Post-irradiation recovery time strongly influences the skin barrier function and drug absorption after fractional CO_2 laser treatment

Chi-Feng Hung[1], En-Li Chen[2], Jia-You Fang[2]
[1]Fu Jen Catholic University, [2]Chang Gung University

The present study aimed to explore the influence of recovery time after fractional CO_2 laser irradiation on the enhancement of drug penetration. The fractional laser produced microchannels of about 150 μm in diameter and 25 μm in depth that were surrounded with thermal coagulation. The bright-field imaging indicated that the micropores were progressively closed during the recovery period but had not completely closed even after a 16-h recovery.

ALPSp2-30

Displacement Characteristics of Human Finger Skin by Mid-Air Ultrasonic Haptics

Mifuka Nakamura, Nobuya Sato, Daisuke Mizushima
Aichi institute of Technology

In this study, skin displacements characteristics were measured by the Mid-air ultrasonic haptics device. Since the results are similar to those of imitation skin material, we can observe skin displacement during tactile presentation.

ALPSp2-31

An Integrating Sphere Spectrophotometer Prototype

Angelica Hernandez Rayas[1], Eduardo Montes Ramirez[1], Teodoro Cordova Fraga[1], Rafael Guzman Cabrera[2], Erick Sarmiento Gomez[1]
[1]Division of Sciences and Engineering, University of Guanajuato Campus León., [2]Engineering Division, University of Guanajuato Irapuato-Salamanca Campus. Carretera Salamanca - Valle de Santiago

In recent years, the need to develop portable and accessible spectroscopy equipment in the qualitative and quantitative analysis of samples has reduced real-time analysis. The objective is to design and manufacture a prototype of a portable spectrophotometer with an integrating sphere, characterizing the geometry and radiance power simulation.

ALPSp2-32

Investigation of elastography for soft tissue by laser-induced photo thermal elastic wave

Katsuhiro Mikami[1], Tasuku Furube[2], Takuto Hatakeyama[2], Mitsutaka Nemoto[1], Satoru Matsuda[2], Daisuke Nakashima[2]
[1]Kindai University, [2]Keio University

An area called physical oncology has been proposed. In this paper, we report a demonstration of stiffness measurement with phantoms by laser-induced photoacoustic thermal elastic wave in the audible frequency range.

ALPSp2-33

Clinical Study Analyzing Peri-Wound Blood Circulation Using Laser Blood Circulation Imaging System

Yaoyuan Chang[1,3], Yen-Ren Lin[1,2,3], Chu-Chung Chu[1,3]
[1]CHANGHUA CHRISTIAN HOSPITAL, [2]National Yang Ming Chiao Tung University, [3]Chung Shan Medical University

Laser Speckle Contrast Imaging(LSCI) presents a paradigm shift in wound care, offering a more efficient and data-driven approach to enhance patient outcomes.

ALPSp2-34

Characteristics of 2 um OCT based on Tm-Ho co-doped fiber laser supercontinuum

Futa Osaki, Rongjie Zhang, Shotaro Kitajima, Norihiko Nishizawa
Nagoya University

We developed optical coherence tomography (OCT) using supercontinuum in 2 um wavelength band, and investigated wavelength dependence of OCT imaging at 0.9, 1.7, and 2 um wavelength bands for some samples, especially for human fingers.

ALPSp2-35

Transportable dual-comb spectroscopy system for gas monitoring

Takanori Okada, Masao Fujino, Nobutaka Takahashi, Takao Sakurai, Shin Masuda
Advantest Laboratories Ltd.

We demonstrate an environmentally stable transportable dual-comb spectroscopy system consisting of all polarizationmaintaining fibers including mode-locked lasers, detection modules of carrier-envelope offset frequency, and time-domain interference signals.

ALPSp2-36

Development of a Simple and Stable All-Polarization-Maintaining Multi-Comb Source with a Mechanical-Sharing Configuration

Kosei Nagao, Takashi Kato, Akifumi Asahara, Kaoru Minoshima
The University of Electro-Communications

We developed a mechanical-sharing and all-polarization-maintaining tri-comb fiber laser. A Simple and stable multi-comb source was achieved with enhanced mechanical sharing condition using three combs with identical cavity configurations.

Poster Session <Exhibition Hall A>

Thursday, 25 April

ALPSp2 10:30-12:00

ALPSp2-37

152 MHz All-PM Er-doped Figure-9 fiber laser optical frequency comb

Sota Sakaguchi, Shotaro Kitajima, Kwangyun Jung, Norihiko Nishizawa
Nagoya University

A 152 MHz all-PM Figure-9 fiber laser optical frequency comb was developed. Stable long-term operation was achieved, and measured in-loop integrated phase noise and standard deviation of f_{ceo} were 72 mrad and 0.457 mHz, respectively.

ALPSp2-38

Toward Realization of a 30 GHz-Class, High Repetition Rate, Visible Broadband Optical Frequency Comb

Tadashi Matsumoto[1,2], Sho Okubo[2], Ken Kashiwagi[2], Yoshiaki Nakajima[1], Hajime Inaba[2]
[1]Toho University, [2]NMIJ/AIST

We have successfully expanded the 6.8 GHz optical frequency comb to cover the entire visible region by using a high-power Erbium-Doped Fiber Amplifier. We plan to demonstrate the capability at 30 GHz in the future.

ALPSp2-39

Development of a mechanically sharing dual-comb fiber laser with a repetition rate of 100 MHz

Takumi Yumoto[1], Ryusei Uchiyama[1], Takuma Yoshioka[1], Wataru Kokuyama[2], Yu Tokizane[3], Takeshi Yasui[3], Shinichi Matsubara[4], Yoshiaki Nakajima[1]
[1]Toho University, [2]NMIJ/AIST, [3]pLED, [4]JASRI

We have developed an all-polarization-maintaining, mechanically sharing dual-comb fiber laser with a 100 MHz repetition frequency, aimed at expanding the measurable bandwidth in dual-comb spectroscopy.

ALPSp2-40

Development of Broadband Fiber-Based Frequency Comb Source Assisted by Intracavity Nonlinear Optical Effects

Ryusei Uchiyama, Tadashi Matsumoto, Takumi Yumoto, Yoshiaki Nakajima
Toho University

In this study, we generated a broadband optical comb within a fiber laser resonator employing a highly non-linear optical fiber. The outcome was a wideband spectrum with a 10 dB width spanning 114 nm.

ALPSp2-41

Dispersion engineering of high-Q crystalline microresonators for microcomb generation beyond a telecom C-band

Ryomei Takabayashi[1], Hikaru Kodama[2], Yasuhiro Kakinuma[2], Takasumi Tanabe[1], Shun Fujii[3]
[1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, [2]Department of System Design Engineering, Faculty of Science and Technology, Keio University, [3]Department of Physics, Faculty of Science and Technology, Keio University

We propose a strategy of dispersion engineering of microresonator towards mode-locked optical frequency comb generation in near infrared and mid-infrared wavelength regime. We reveal the optimal structure to realize appropriate anomalous dispersion.

ALPSp2-42

Generation of THz Pulse using a Mechanically Stabilized Dual-Comb Fiber Laser

Takumi Yumoto[1], Ryusei Uchiyama[1], Takuma Yoshioka[1], Wataru Kokuyama[2], Yu Tokizane[3], Takeshi Yasui[3], Shinichi Matsubara[4], Yoshiaki Nakajima[1]
[1]Toho University, [2]National Metrology Institute of Japan, [3]Institute of Post-LED Photonics, [4]Japan Synchrotron Radiation Reserarch Institute

We developed an all-polarization-maintaining dual-comb fiber laser. Using this laser, we successfully generated THz pulses. We were able to obtain a THz spectrum by integrating these generated THz pulses and subsequently performing a Fourier transformation.

ALPSp2-43

Ultra-stable DFBLD wavelength stabilization for error-free BPSK-QKD

You-Xin Wang[1], Kuan-Wei Hu[1], Chih-Hsien Cheng[2], Atsushi Matsumoto[2], Kouichi Akahane[2], Gong-Ru Lin[1,3]
[1]National Taiwan University, [2]National Institute of Information and Communications Technology, [3]NTU-Tektronix Joint Research Center, Tektronix Inc. and National Taiwan University

A DFBLD with $<\pm0.0001$°C feedback control and <0.1pm ultra-stable wavelength stability is demonstrated for delay-interferometric BPSK-QKD decoding with <0.5% bit-amplitude fluctuation and error-free BER of $<8.6\times10^{-10}$.

ALPSp2-44

A theory about left slit residual light causing magical bright pattern in double slit interference experiment

Haijiang Liu
Beijing universitu of technology

In the double slit interference experiment, light moves forward in a flat elliptical spiral,The photons at the edges break and escape, generating a bright pattern forward. After blocking the right slit, residual light in the left slit will cause a bright offset pattern. and a new formula for the spacing between patterns.

ALPSp2-45

Ultra-stable Control of Single-photon Transmitter and Decoder for Differential Phase-Shifted Quantum-Key Distribution

Shih-Chang Hsu[1], You-Cheng Lin[1], Kuan-Wei Hu[1], Chih-Hsien Cheng[2], Atsushi Matsumoto[2], Kouichi Akahane[2], Gong-Ru Lin[1,3]
[1]National Taiwan University, [2]National Institute of Information and Communications Technology, [3]NTU-Tektronix Joint Research Center, Tektronix Inc. and National Taiwan University

Ultra-stable control on bias of $Di/i<10^{-4}$ and temperature of $DT/T<7^{*}10^{-5}$ for single-photon transmitter and stabilized isothermal control of 1-bit-delay interferometer enables secure quantum-key transmission with erroneous rate of <3% under ultra-low wavelength and power perturbations of $D\lambda/\lambda<10^{-6}$ and $DP/P<10^{-4}$.

ALPSp2-46

Polarization-insensitive quantum frequency conversion module based on the Mach-Zehnder interferometer

Shinichi Takenaka[1], Shoichi Murakami[1,2], Toshiki Kobayashi[1,2], Takashi Yamamoto[1,2], Rikizo Ikuta[1,2]
[1]Graduate School of Engineering Science, Osaka University, [2]Center for Quantum Information and Quantum Biology, Osaka University

We report a fiber-pigtailed quantum frequency conversion module based on the Mach-Zehnder interferometer. The experimental results show that the module works well for arbitrary polarization state of light with high fidelity.

ALPSp2-47

Rabi Oscillations of Higher-Order Spin States in Quantum Disks using Higher-Order Photons with Resonant Frequencies

Kaito Terashima, Ken Morita
Chiba University

Rabi oscillations between higher-order excited states and ground states in semiconductor quantum disks are calculated. The results suggest that the higher-order states with OAM can be manipulated by irradiating higher-order photons that possess OAM.

ALPSp2-48

Polarization-entangled photon pair generation using tandem type-II QPM PPLN waveguide

Shunsuke Hiraoka[1], Shoichi Murakami[1,2], Daiki Hara[1], Toshiki Kobayashi[1,2], Fumihiro China[3], Shigehito Miki[3,4], Hirotaka Terai[3], Tsuyoshi Kodama[3,5], Tsuneaki Sawaya[5], Akihiko Ohtomo[5], Hideki Shimoi[5], Rikizo Ikuta[1,2], Takashi Yamamoto[1,2]
[1]Graduate School of Engineering Science, Osaka University, [2]Center for Quantum Information and Quantum Biology, Osaka University, [3]Advanced ICT Research Institute, National Institute of Information and Communications Technology, [4]Graduate School of Engineering, Kobe University, [5]Hamamatsu Photonics K.K.

We present a compact polarization-entangled photon pair source at wavelengths of 1540 nm and 1582 nm using a tandem type-II QPM PPLN waveguide.

ALPSp2-49

From Beam to Bedrock: The Application of High-Power Lasers in Subsurface

Damian Pablo San Roman Alerigi, Sameeh I Batarseh, Ahmad A Alrashed, Safiyah Alghamdi
EXPEC Advanced Research Center, Aramco

The first deployment of a high-power laser tool for subsurface environments is a crucial milestone in enabling photonic applications for energy extraction and exploration. It provided insights for advancements in optics, optomechanics, and energy conveyance.

ALPSp2-50

On the transmission of multi-kilowatt near-infrared lasers to subsurface targets

Damian Pablo San Roman Alerigi, Sameeh I Batarseh
EXPEC Advanced Research Center, Aramco

Applying high-power lasers in the subsurface demands advancements in long-haul laser delivery fibers. However, this task presents unique challenges due to material limitations, non-linear scattering effects, and environmental factors.

Poster Session <Exhibition Hall A>

Thursday, 25 April

BFSSp 10:30-12:00

BFSSp-01

The aim of Business and Finance for Sustainable Society - towards the expansion of the photonics industry -

Ryohei Hanayama, Rie H. Kang
GPI

This is a brief introduction to the brand-new conference on Business and Finance for Sustainable Society (BFSS) towards the expansion of the photonics industry.

SLPCp 10:30-12:00

SLPCp-01

Compression Properties of 3D-Printed Structures

Fan-Chun Hsieh[1], Chien-Yao Huang[2], Jun-Cheng Chen[2], Chin-Hao Lin[1], Tai-Jung Li[1], Min-Kuei Chen[1]
[1]National Chin-Yi University of Technology, [2]Taiwan Instrument Research Institute, National Applied Research Laboratories

3D printing has been utilized to create lightweight structures to enhance toughness. This study examine the compression properties of honeycomb and center-shaped structures by using digital light processing. Our findings indicate that both the honeycomb and center-shaped structures exhibit low compressive strength when compared to the combination of center and honeycomb structures. This study provides valuable insights for the application of absorption.

SLPCp-02

Influence of Processing Parameters on Microstructure and Mechanical Properties of a Ti-6Al-4V Alloy Additively Manufactured by Pulsed Laser Powder Bed Fusion

Naoya Nishikawa[1], Yuta Mizuguchi[2], Takahiro Kunimine[1], Yuji Sato[2], Masahiro Tsukamoto[2]
[1]Kanazawa University, [2]Osaka University

We investigate the possibility of controlling processing heat input and controlling microstructure of the additively manufactured Ti-6Al-4V alloy by leveraging pulsed LB-PBF.

SLPCp-03

Temperature Gradient Measurement and Microstructural Characterization of Rapidly Solidified HS 6-5-2 High-Speed Steel by Multi-Beam Laser Melting

Masamitsu Takahashi[1], Kholqillah Ardhian Ilman[1], Yorihiro Yamashita[2], Takahiro Kunimine[1]
[1]Kanazawa University, [2]Ishikawa College

This study explored the processing of single beads composed of ISO HS 6-5-2 high-speed steel (HSS) using the multi-beam laser melting method and a modified multi-beam laser focusing technique. Especially, the effects of multi-beam laser focusing position and laser power on rapidly solidified microstructure and temperature variation of the ISO HS 6-5-2 HSS during the laser melting process were investigated.

SLPCp-04

Size effect of SiC nanoparticles on SiC patterning properties in green femtosecond laser direct writing

Kairi Nishisaka[1], Amarsaikhan Khaliun[1], Masashi Watanabe[2], Yoshiyuki Imai[2], Shohei Ueta[2], Xing Yan[2], Mizue Mizoshiri[1]
[1]Nagaoka University of Technology, [2]Japan Atomic Energy Agency

The size effect of SiC nanoparticles on femtosecond laser SiC patterning was investigated using different sizes of SiC nanoparticles. Finer particles with ~18 nm in diameter achieved the high resolution and less oxidization.

SLPCp-05

Fabrication of Ti-6Al-4V using selective laser melting with blue diode laser

Koki Maeda[1], Ryoga Ueda[1], Keisuke Takenaka[2], Yuji Sato[2], Minoru Yoshida[1], Hitoshi Nakano[1], Masahiro Tsukamoto[2]
[1]Graduate School of Science and Engineering, Kindai University, [2]Joining and Welding Research Institute, Osaka University

Blue diode lasers have high optical absorption for many metallic materials and higher photoelectric conversion efficiency than fiber lasers. We have developed a 200 W high-brightness blue diode laser and have developed a selective laser melting method using this laser. In this study, we attempted to shape Ti-6Al-4V, which is known as a difficult-to-machine material, using the SLM method equipped with a blue diode laser.

SLPCp-06

Effect of Wavelength on Blue Diode Laser Induced Powder Bed Fusion for 3D Fabrication of Nickel-Based Alloy

Ryoga Ueda[1], Koki Maeda[2], Keisuke Takenaka[3], Eiji Hori[3], Norio Yoshida[3], Yuji Sato[3], Minoru Yoshida[1], Masahiro Tsukamoto[3]
[1]Grad.Sch. of Sci.and Eng Kindai University, [2]Fac.of Sci.and Eng., Kindai University, [3]Joining and Welding Research Institute, Osaka University

3D fabrication of nickel-based alloys was performed using a high-power blue diode laser and compared to a near-infrared laser. Also, the effect of different wavelengths on fabrication was researched.

SLPCp-07

Comparison between Blue and N-IR laser for pure copper layer formation by wire-based laser metal deposition

Satoshi Yoshida[1], Masami Mizutani[2], Keisuke Takenaka[2], Yuji Sato[2], Masahiro Tsukamoto[2]
[1]Graduate School of Engineering, Osaka University, [2]Joining and Welding Research Institute, Osaka University

We formed pure copper layers by Wire-based Laser Metal Deposition. Comparing a blue laser and a near-infrared laser, the forming efficiency using a blue laser was five times higher than using a near-infrared laser.

SLPCp-08

Fabrication of Nickel based alloy by multi-beam LMD method with blue diode lasers

Ryuhei Matsuda[1], Keisuke Takenaka[2], Yuji Sato[2], Mitsuhio Kusaba[1], Masahiro Tsukamoto[2]
[1]Osaka Sangyo University, [2]Osaka University

Inconel 718, a Nickel alloy, was fabricated on a SUS304 substrate using a multi-beam LMD method with two blue diode lasers at a wavelength of 450 nm and a maximum output power of 200 W.

SLPCp-09

Experimental observation of Cu-Zn alloy coating process by multi-beam laser metal deposition using blue diode lasers

Ritsuko Higashino, Yuji Sato, Keisuke Takenaka, Nobuyuki Abe, Masahiro Tsukamoto
Joining and Welding Research Institute, Osaka University

We demonstrated to coat the copper with zinc to improve discoloration resistance by multi beam LMD using blue diode laser.In order to form copper alloy layer as a difficult to process, it is considered necessary to find optimal conditions such as laser power density, speed and so on.

4/25 13:30-15:00

SLPCp-10

Formation of pure copper layer on aluminum nitride by multi-beam laser cladding with blue diode lasers

Jumpei Tokumoto[1], Keisuke Takenaka[1], Yuji Sato[1], Masahiro Tsukamoto[1], Koji Kobayashi[2], Hideyo Osanai[2], Koji Tojo[3]
[1]Joining and Welding Research Institute, Osaka University, [2]DOWA POWER DEVICE Co., Ltd., [3]SHIMADZU CORPORATION

Copper layer was formed on aluminum nitride by multi-beam laser cladding with blue diode lasers, and the influence of laser irradiation conditions such as the power density, scanning speed and powder feeding rate were investigated.

SLPCp-11

Femtosecond laser processing of polyimide

Masaki Uematsu[1], Saulius Juodkazis[2], Vygantas Mizeikis[1]
[1]Shizuoka University, [2]Swinburne University of Technology

We report on microfabrication of polyimide using femtosecond laser pulses, and describe the obtained modification of its structural, optical, electrical, and thermal properties of PI. The main processes addressed are fs laser-induced carbonization of polyimide and generation of laser-induced periodic surface structures (LIPSS). Application of these modifications for the fabrication of optical, electronic and thermal devices will be outlined.

SLPCp-12

Estimation of surface roughness for antimicrobial structure evaluation from the reduction in reflectance.

Mikuru Okazaki[1], Masaki Hashida[1,2], Satoru Iwamori[1]
[1]Tokai University, [2]Kyoto University

In 2023, it was confirmed that LIPSS formed on stainless steel by YAG laser irradiation suppressed bacterial growth. This shows that structures with antibacterial properties can be formed using lasers. As a method to confirm the microstructure, we focused on a method to determine surface roughness from the reduction of reflectance.

Poster Session <Exhibition Hall A>

Thursday, 25 April

SLPCp 10:30-12:00

SLPCp-13

Cell Cultivation Control of Surface Patterning Using Laser Induced Backward Transfer

Sangwoo Yoon, Joohan Kim
Seoul National University of Science and Technology

When culturing Staphylococcus aureus on the created surface, the inability of cell to grow well was more pronounced with increasing influence of alumina. Therefore, through patterning using laser-induced backward scattering deposition of alumina and zirconia, selective cell cultivation or proliferation suppression can be controlled.

SLPCp-14

Observation of Phenomena in Laser Ablation Under Liquid with Fine Bubbles

Zhen Wei Hsu[1], Hao Wei Du[1],
Yuan Jen Chang[2], Chia Lung Kuo[1]
[1]National Yunlin University of Science & Technology, [2]National Taipei University of Technology

In this study, we used various liquid with fine bubbles prepared by our home made generator to observe various phenomena of laser ablation.

SLPCp-15

Effect of laser peening on changed acoustic impedance of plasma confinement layer

Miho Tsuyama[1], Yang Zhang[1], Manabu Heya[2], Hitoshi Nakano[1]
[1]Kindai University, [2]Kindai University

In efficient laser peening, a high amplitude shock impulse is necessary. The shock impulse can be increased by confinement of the laser-produced plasma through the acoustic impedance of a plasma confinement layer. To perform efficient laser peening, it is necessary to select a plasma confinement medium with consideration to acoustic impedance. In this study, the effect of laser peening is examined on the acoustic impedance of a plasma confinement medium.

SLPCp-16

Nanosecond double-pulse laser irradiation for efficient laser peening

Akio Geshiro[1], Tomohiro Shimotsuma[1], Miho Tsuyama[1], Manabu Heya[2], Hitoshi Nakano[1]
[1]Faculty of Science and Engineering, Kindai University, [2]Faculty of Engineering, Kindai University

In this study, double-pulsed laser irradiation has been adopted for efficient laser peening. The hardness difference has the dependence on the pre-pulse intensity and is efficient for the delay time of 10 ns. Double-pulsed laser was found to be an effective for laser peening.

SLPCp-17

Effects of Multi-Spot Laser Peening on Stainless steel

Natsuki Furukawa[1], Megat Adam Bin Megat Harris[1], Taiki Nakayama[1], Kazuma Takakura[1], Manabu Heya[2], Hitoshi Nakano[1]
[1]Faculty of Science and Engineering, Kindai University, [2]Faculty of Engineering, Kindai University

Effects of multi-spot laser peening have been investigated. Evaluation of laser peening performance and laser peening effect were conducted by measuring the magnitude of compressive residual stress, hardness difference and magnitude of shock wave.

SLPCp-18

Capping effect of polyvinylpyrrolidone added to glyoxylic acid nickel complex on femtosecond laser nickel patterning

Minori Takahashi[1], Tomoji Ohishi[2], Mizue Mizoshiri[1]
[1]Nagaoka University of Technology, [2]Shibaura Institute of Technology

Finer Ni patterns were written by femtosecond laser pulse-induced thermochemical reduction using polyvinylpyrrolidone (PVP) -added glyoxylic acid Ni complex ink. The line width was 0.13 times smaller than using the ink without PVP.

SLPCp-19

Processing of polymer resin films by short-pulse He-free CO_2 laser

Daikichi Miyagawa, Katsunori Negishi, Ryo Okawa, Kazuyuki Uno
University of Yamanashi

Processing characteristics of polymer resin films using a short-pulse He-free CO_2 laser were investigated. Minimum total irradiation fluences required to form a through hole and minimum total irradiation fluences where undesired carbonization occurs were investigated.

SLPCp-20

Nano Dot Structures on the Surface of Si Solar Cells Produced by XeCl and KrF Excimer Laser Pulses

Mitsuhiro Kusaba[1], Kenta Hirai[1], Tomoyo Tanaka[1], Daisuke Tsutsumi[1], Masaki Hashida[2,3], Hitoshi Sakagami[4]
[1]Osaka Sangyo University, [2]Tokai University, [3]Kyoto Univeristy, [4]National Institute for Fusion Science

When a silicon solar cell was irradiated with KrF excimer laser with laser fluences lower than the melting threshold, nanodot structures with a height of less than 100 nm were formed.

SLPCp-21

Optimization of computer-generated hologram under adaptive aberration correction in holographic laser processing machine

Koichi Takahashi, Yoshio Hayasaki
Center for Optical Research and Education (CORE), Utsunomiya University

In order to achieve high-throughput and high-definition femtosecond laser processing, we use parallel processing using holographic laser processing and in-system optimization of adaptive optics and CGH to reduce wavefront distortion caused by optical elements such as SLM and the processing environment.

SLPCp-22

Towards Entirely Ultrashort Pulsed Laser Based Process Chain to Manufacture Polymer Lab-on-Chip Systems with Electrical, Photonic, and Microfluidic Functionalities

Kay Bischoff[1], Stefan Kefer[1], Cemal Esen[2], Ralf Hellmann[1]
[1]Applied Laser and Photonics Group, University of Applied Sciences Aschaffenburg, [2]Applied Laser Technologies, Ruhr University Bochum

This contribution summarizes our recent developments towards an entirely ultrashort laser-based process chain for the fabrication of polymer lab-on-chip systems with electrical, photonic, and microfluidic functionalities, discusses challenges and gives an outlook on promising applications.

SLPCp-23

Investigation of fs-LIPSS on sapphire suitable for anti-reflection property

Yasushi Minemura, Godai Miyaji
Tokyo University of Agriculture and Technology

We have investigated the reflectivity at sapphire surfaces with fs-LIPSSs by using an RCWA method. The result clearly shows that the surface with sinusoidal nanostructures of ≦250 nm in period can strongly reduce the reflectivity.

SLPCp-24

Flat-Top Beam Shaping with Increased Depth of Focus for Laser Material Processing

Kasumi Kawasaki, Yoshio Hayasaki, Satoshi Hasegawa
Utsunomiya University

Beam shaping technology for shaping Gaussian beams into flat-top beams has been applied in materials processing. The issue of the generated flat-top beam is its short depth of focus. In this paper, we demonstrated the flat-top beam shaping with increased depth of focus using two SLMs. We used algorism for phase retrieval and phase compensation.

SLPCp-25

Spectroscopic analysis of blue diode laser-induced plumes and evaluation of interference between plumes and laser in pure copper welding

Mao Sudo[1], Shumpei Fujio[1], Kazuki Koda[2], Hideaki Shirai[2], Keisuke Takenaka[3], Masami Mizutani[3], Yuji Sato[3], Masahiro Tsukamoto[3]
[1]Osaka University, [2]DENSO CORPORATION, [3]JWRI, Osaka University

Spectroscopic analysis revealed the atoms and molecules constituting plumes and their spatial distribution in pure copper welding using blue diode laser. The melting depth increased with plumes removed, suggesting interference between plumes and laser beam.

BISCp 13:30-15:00

BISCp-01

Scanless three-dimensional photostimulation with single cell resolution using time-multiplexed multi-line temporal focusing

Kenta Inazawa[1,2,3], Keisuke Isobe[1,2], Takayuki Michikawa[1,4], Kana Namiki[4], Atsushi Miyawaki[1,4], Katsumi Midorikawa[1]
[1]RIKEN RAP, [2]Graduated of Biostudies, Kyoto University, [3]Hamamatsu K.K., [4]RIKEN CBS

We developed a scanless three-dimensional patterned illumination system that combines time-multiplexed multi-line temporal focusing with the CGH technique. In our system, even the $1/e^2$ width of axial resolution is 5.3 μm, which is better than single cell size. We also demonstrated precise scanless excitation in 3D by suppressing hologram distortion and multi-spot interference.

BISCp-02

Multiple beam focusing via digital holograms for scanning lensless vascular endoscope

Hibiki Kunii, Masaki Hisaka
Osaka Electro-Communication University

We developed a scanning lensless vascular endoscope that employs a spatial phase modulator to observe narrow blood vessels. Digital hologram technology for local wavefront control formed multiple focusing beams passing through an optical fiber bundle.

BISCp-03

Residul water removal for in vivo MRS preprocessing

Zheng-De Hong[1], Yi-Ru Lin[1], Shang-Yueh Tsai[2]
[1]Dept of Electronic and Computer Engineering, National Taiwan University of Science and Technology, [2]Graduate Institute of Applied Physics, National Chengchi Univeristy

Removal of the residual water signal from in vivo spectra could enhance the reliability of metabolites quantification. Techniques such as SVD (singular value decomposition) and HLSVD (Hankel Lanczos singular value decomposition) were often applied for residual water removal. In this study, we aimed to investigate the influence of number of components. We proposed an automatic evaluation strategy to select the optimal number of components for each spectrum.

BISCp-04

Estimation of the Number of Chemical Species in Bio-Raman Data and Effective Use of the Savitzky-Golay Filter

Shin-ichi Morita[1], Jianhai He[1], Mohamed M. Abdel Galeil[1,2]
[1]Graduate school of science, Tohoku University, [2]Faculty of Science, Tanta University

In bio-Raman research, principal component analysis and non-negative matrix factorization (NMF) have been frequently used. In this presentation, effective determination of the number of the components in NMF is mainly proposed and argued.

BISCp-05

Nanoimprint Meta-device for Chiral Imaging

Jingcheng Zhang, Mu Ku Chen, Din Ping Tsai
City University of Hong Kong

In this work, a chiral imaging meta-device with a large area and broadband chirality control is experimentally demonstrated. The centimeter-scale Moiré meta-device is achieved using nanoimprint technology.

Poster Session <Exhibition Hall A>

Thursday, 25 April

BISCp 13:30-15:00

BISCp-06

Estimation of skin tissue parameters using heat map in data mining.

Rei Nishimura[1], Hikaru Tamura[1], Atsumu Miyatsu[1], Tomonori Yuasa[1], Kumiko Kikuchi[2], Yoshihisa Aizu[1]
[1]Muroran Institute of Technology, [2]Shiseido Co. Ltd., MIRAI Tech. Inst.

We used Monte Carlo simulations to study spectral reflectance in human skin tissue. Estimating skin tissue parameters like absorption and scattering coefficients from data-mined spectra is crucial to understanding skin conditions. Our novel method, employing heat maps, accurately estimates these coefficients and was validated against conventional methods.

BISCp-07

Integrated-resonant meta-devices: enhancing achromatic focused beam generation

Rong Lin[1], Jin Yao[1], Mu Ku Chen[1,2,3], Din Ping Tsai[1,2,3]
[1]Department of Electrical Engineering, City University of Hong Kong, [2]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [3]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong

We proposed compact integrated-resonant meta-devices to generate achromatic focused beams in the visible spectrum, which can improve imaging quality and edge-detection precision.

BISCp-08

Classification of *in Vivo* Optical Coherence Tomography (OCT) Images of Colon Polyps using Multi-Spectral Analysis

Costas Pitris[1], Andrew Thrapp[2], Guillermo Tearney[2]
[1]KIOS Center of Excellence, University of Cyprus, [2]Massachusetts General Hospital & Harvard Medical School

Optical Coherence Tomography can be used to address some limitations of colonoscopy. The interferometric spectral information was used to create multiple, narrow-band, images, at different wavelengths, which were combined to create a "spectral score" for each pixel. This approach improved the visual evaluation of the images as well as the automatic classification of the images (82% accuracy).

BISCp-09

2D Single-shot Spectral-domain Optical Coherence Tomography by Synchronization of pulse light source and camera

Satoe Murazawa, Keito Fukuda, Tatsutoshi Shioda
Saitama University

Synchronization of the light source emission and capturing of the image sensor improved the sharpening the 2D-image and vibrational robustness.

BISCp-10

Auto-detection of red blood cells and blood coagulation structures in flow cytometry using digital holographic microscopy

Hideki Funamizu
Muroran Institute of Technology

Digital holographic microscopy is actively investigated in quantitative phase imaging due to direct access to amplitude and phase information and therefore is an important role in bio-imaging such as the observation of cell morphology. In this study, we demonstrate the auto-detection of red blood cells and blood coagulation structures in flow cytometry using digital holographic microscopy.

BISCp-11

One-dimensional digital holography for shape measurement

Yuma Sato
Utsunomiya University

We propose one-dimensional digital holography for a shape measurement of an object that is moving laterally with a known velocity. The one-dimensional digital holography is based on one-dimensional intensity detection and calculation. The repetition of the digital holography is higher than that of the ordinary two-dimensional digital holography. Therefore, it is effective for industrial applications requiring high throughput.

BISCp-12

Improvement of spatial resolution enhancement in digital holographic microscopy using speckle illuminations

Hideki Funamizu, Soshi Taneda
Muroran Institute of Technology

Digital holographic microscopy using speckle illuminations is one of the methods for the spatial resolution enhancement and image quality improvement of reconstructed images. In this study, we report an improvement of spatial resolution enhancement in digital holographic microscopy using speckle illuminations.

BISCp-13

Underwater 3D Imaging by a Functionally Integrated Waveguide Illuminator-based Digital Holographic Microscope

Maryam Faheem[1], Kenta Hayashi[1], Katsunari Okamoto[2], Ayaka Tabuchi[1], Eriko Watanabe[1]
[1]The University of Electro-communications, [2]Okamoto Laboratory

This study demonstrated ultra compact Digital Holographic Microscope with a novel optical device: Functionally Integrated Waveguide Illuminator (FIWI). It can be utilized in challenging environments for 3D imaging of microscopic entities in random media.

BISCp-14

Phase measurements for plant cells using transport-of-intensity phase imaging under commercially available confocal microscopy

Naru Yoneda[1,2], Takumi Tomoi[3,4], Joe Sakamoto[5,6], Yosuke Tamada[3,7,8], Osamu Matoba[1,2]
[1]Graduate School of System Informatics, Department of System Science, Kobe University, [2]Center of Optical Scattering Image Science, Kobe University, [3]Faculty of Engineering, Utsunomiya University, [4]Center for Innovation Support, Institute for Social Innovation and Cooperation, Utsunomiya University, [5]Biophotonics Research Group, Exploratory Research Center on Life and Living Systems, [6]Division of Biophotonics, National Institute for Physiological Science, [7]Center for Optical Research and Education (CORE), Utsunomiya University, [8]Robotics, Engineering and Agriculture-Technology Laboratory (REAL), Utsunomiya University

Quantitative phase imaging (QPI) based on transport of intensity equation (TIE) under commercially available confocal microscopy have been proposed. The proposed method uses bright field module attached in usual confocal microscopy. In this paper phase distributions of plant cells are measured by using TIE-based confocal microscopy. The experimental results indicate the proposed method can measure phase distributions of the moss Physcomitrium patens.

BISCp-15

Development a Real-time Optical Imaging System for In Vivo Fluorescence Detection

Rui Cian Weng, Yen Pei Lu, Chi Hung Hwang
Taiwan Instrument Research Institute, National Applied Research Laboratories

In recent years, non-invasive molecular probes have emerged as a key technique in in vivo optical imaging, drawing attention across preclinical imaging, pharmaceuticals, gene expression, and regenerative medicine. These methods enable real-time tracking of disease progress and treatment responses, offering high sensitivity to measure luminescent and fluorescent signals, facilitating image calibration and quantitative comparisons.

BISCp-16

Quantitative evaluation of lipid mechanical properties in metabolic dysfunction-associated steatotic liver disease by use of Brillouin scattering microscopy

Naoya Okubo[1], Eiji Hase[2], Kazuki Yasumaru[1], Yu Tokizane[2], Mayuko Ichimura-Shimizu[3], Koichi Tsuneyama[3], Takeo Minamikawa[2], Takeshi Yasui[2]
[1]Grad. Sch. Sci. Tech. Innov. Sci. Tokushima Univ., [2]Inst. Post-LED Photonics, Tokushima Univ., [3]Grad. Sch. Med. Sci. Tokushima Univ.

We applied Brillouin scattering microscopy to the quantitative analysis of mechanical properties of lipid droplets in the liver tissue and succeeded in evaluating the differences in Brillouin frequency shift depending on their crystallinity.

BISCp-17

Non-Invasive Quantification of the Photon Fluence Rate in the Prefrontal Cortex for Transcranial Photobiomodulation (tPBM)

Bo-Yong Lin, Yu-Peng Hsieh, Tzu-Chia Kao, Kung-Bin Sung
National Taiwan University

The prediction model estimated the fraction of the stimulation source penetrating the prefrontal cortex non-invasively. Using an individually optimal dose by model reduces the error compared to using a constant dose for the recipient.

BISCp-18

Parallel light sources generated with computer-generated hologram for laser scanning-based broadband imaging

Kota Kumagai[1], Hsin-hui Huang[2], Koji Hatanaka[3,1], Saulius Juodkazis[2], Yoshio Hayasaki[1]
[1]Utsunomiya University, [2]Swinburne University of Technology, [3]Okayama University

Parallel generated femtosecond-laser-driven light sources on a water film have been applied to laser-scanning-based broadband imaging. The number of light sources was controlled by a computer-generated hologram displayed on a liquid crystal on silicon spatial light modulator. We have demonstrated that parallel generated light sources improves the contrast of reconstructed images.

BISCp-19

Image Reconstruction Quality for Speckle Correlation Imaging with the Number of Nonzero-Pixels Constraint

Kenta Mizuno, Wataru Watanabe
Ritsumeikan University

Reconstuction conditions of an object placed behind a diffuser in speckle correlation imaging were examined by changing an additional support constraint in object domain constraints with nonzero-pixel constraints.

BISCp-20

Quantification of age-dependent acute and cumulative effects of safety-dose doxorubicin hydrochloride on the cardiac dynamics of larval zebrafish

Min Lee[1], Yu-Hsuan Huang[1], Yin-Jhen Jian[1], Huai-Jen Tsai[2], Po-Sheng Hu[1]
[1]College of Photonics, National Yang Ming Chiao Tung University, [2]School of Medicine and department of life science, Fu Jen Catholic University

This study investigates the acute and cumulative effects of doxorubicin (DOX) on the age-dependent cardio-dynamic parameters of zebrafish larvae using lightsheet fluorescence microscopy. Experimental results indicate the lethal dosage beyond 15 ppm for the elder group, and better tolerance up to 60% survival rate at 20 ppm for the younger group.

Poster Session <Exhibition Hall A>

Thursday, 25 April

BISCp 13:30-15:00

BISCp-21

Bio-Raman Spectral Analysis of Living Cells

Shin-ichi Morita[1], Mohamed M. Abdel Galeil[1,2], Jianhai He[1], Kazumasa Ohashi[1], Yuki Umeda[3], Satoshi Yamaguchi[3]
[1]Graduate school of science, Tohoku University, [2]Faculty of Science, Tanta University, [3]Graduate school of engineering, The University of Tokyo

Recently it became possible to measure Raman spectra of a single live cell using a standard Raman microscope. We have developed mathematically analytical methods compatible to bio-Raman research. We are going to show the recent developments.

BISCp-22

High-Speed DNA Analysis Platform Based on Lasing Silica Microsphere

Wonsuk Lee[1], Chan Seok Jun[2]
[1]Korea Institute of Science and Technology, [2]Korea University

We detect a target DNA sequence with a single laser emission burst from silica microsphere based optofluidic ring resonator.

BISCp-23

Enhancing the Variation of Fluorescence Signal of qPCR System Through Two-Dimensional Visualization Image and Intelligent Image Analysis

Cheng-Ru Li[1], Liang-Chieh Chao[1], Hsin-Yi Tsai[1], Yu-Hsuan Lin[1], Kuo-Cheng Huang[1], Dar-Bin Shieh[2]
[1]Taiwan Instrument Research Institute, National Applied Research Laboratories, [2]Institute of Oral Medicine, School of Dentistry, National Cheng Kung University

This study proposed the two-dimensional (2D) visualization image and intelligent image analysis method to determine the tiny fluorescence variation. The results showed that the sum of intensity above threshold had better resolution than average intensity.

BISCp-24

Preliminary Finding on Resting Metabolite Levels for Brain Region of Default Mode Network

Kuan-Hsueh Chou[1], Yi-Ru Lin[1], Shang-Yueh Tsai[2]
[1]Dept of Electronic and Computer Engineering, National Taiwan University of Science and Technology, [2]Graduate Institute of Applied Physics, National Chengchi Univeristy

MRSI is used to measure the metabolite concentrations along medial wall that consisting most of brain regions in default mode network (DMN). This study found that NAA and Cre show higher baseline levels in DMN regions covering part of prefrontal cortex and posterior cingulate cortex than in non DMN regions. This preliminary finding suggest that active neuronal activity of DMN may result in higher baseline metabolite levels.

BISCp-25

Pressure injury ulcer stage classification based on convolution neural network image recognition

Ying-Jui Huang, Wei-Cheng Hung, I-Hsu Hsu, Chao-Teng Su, Fu-Li Hsiao
Institute of Photonics, National Changhua University of Education

We use different pre-trained convolution neural networks to classify the level of pressure injuries. The performance of these model are compared by Grad-CAM and accuracies.

BISCp-26

Development of Rapid, Highly Selective Spectrophotometric Method for the Detection of Trace Amounts of Nitroxoline in Tablet, and Human Serum

Mohamed Mubark Abdel-Galeil Mohamed[1,2], Salah E. El-Zohary[3,2], Tarek Alharby[3], Hanaa S. El-Desoky[2], Shin-Ichi Morita[1]
[1]Tohoku University, Japan, [2]Tanta University, Egypt, [3]Taibah University, 42353, Almadinah Almunawwarah, Saudi Arabia

This study introduces an efficient spectrophotometric method for quantifying nitroxoline in diverse matrices. Optimal outcomes were achieved at a pH of 7, utilizing a 40% (v/v) ethanol solution. The detection limit for nitroxoline in bulk samples established at $1.5x10^{-7}$ mol L^{-1}.

BISCp-27

Real Time Musculoskeletal Ultrasound Image Annotations

Hsin-Yuan Chu[1], Hao-Yu Hung[1], Jyun-Ping Kao[1], Chung-Ping Chen[1], Wen-Shiang Chen[2]
[1]National Taiwan University, [2]National Taiwan University Hospital

We have developed an automated annotation system using deep learning neural networks assists in the real-time identification of anatomical for clinical use, improving the interpretation of musculoskeletal ultrasound images.

BISCp-28

Classification of Chest X-Ray picture for Hyperbaric oxygen therapy based on convolutional neural network

Ting Wei Chiang[1], Yan Bo Chen[1], Chien-Teng Lin[1], Cheng-Yi Hsieh[2], Ying-Jui Huang[1], Wei-Chia Su[1], Fu-Li Hsiao[1]
[1]Institute of Photonics, National Changhua University of Education, [2]Department of Physics, National Changhua University of Education

We used various pre-trained CNNs to classify Chest X-rays for hyperbaric oxygen therapy suitability. The optimal accuracies are 100% for all used model. The feature extraction behaviors are studied by Grad-CAM.

BISCp-29

Dual-Wavelength Fluorescence Imaging based on the Transport of Intensity Equation

Yukie Naka[1], Masaaki Kiyosumi[1], Wataru Watanabe[1], Osamu Matoba[2,3]
[1]Ritsumeikan Univ., [2]Grad. Sch. System Informatics, Kobe Univ., [3]OaSIS, Kobe Univ.

Fluorescence imaging, the transport of intensity equation (TIE), and propagation calculation can reconstruct intensity and phase images at arbitrary depths. Dual-wavelength fluorescence imaging and TIE with one light source were used with fluorescent beads with two fluorescence spectra.

BISCp-30

Estimation of Bone Density by Machine Learning with L-RFA data

Tetsuya Matsuyama[1], Katsuhiro Mikami[1], Mitsutaka Nemoto[1], Ryoichi Akiyoshi[1], Reo Terauchi[1], Takuto Hatakeyama[2], Takeo Nagura[2], Daisuke Nakashima[2]
[1]Kindai University, [2]Keio University

In this study, analysis scheme was developed to estimate a bone density using machine learning from vibration data induced by laser irradiation on implants placed in simulated bone.

BISCp-31

Thermal imaging inside an object using an infrared photovoltaic detector for noncontact high-speed core temperature measurement

Ryo Shibano, Masaki Hisaka
Osaka Electro-Communication University

We examined a thermometer using an infrared point photovoltaic detector for noncontact and rapid measurement of human core temperature. An experimental investigation into the consequences of high-speed thermal imaging within object interiors was conducted.

BISCp-32

Phase-contrast enhancement of biological samples in single-shot X-ray phase-contrast imaging technique

Myung-Joon Kwack[1], Sooyeul Lee[1], Yoonseon Song[1], Seung-Hoon Chae[1], Byung Gyu Chae[1], Hyunwoo Lim[2], Duhee Jeon[2], Hyosung Cho[2]
[1]Electronics and Telecommunications Research Institute, [2]Yonsei University

We proposed a weighted mean filtering technique applied to Fourier-transformed Moiré-less 1st-harmonics images to enhance the image quality of biological samples in single-shot X-ray phase-contrast imaging. The SNR has been improved by more than 25.9%.

IPp 13:30-15:00

IPp-01

Aberration correction based on transport of intensity equation

Shuhei Kasuda[1,2], Yoshio Hayasaki[1,2], Satoshi Hasegawa[1,2]
[1]Utsunomiya University, [2]Center for Optical Research and Education(CORE)

To perform the aberration correction in the optical system, quantitative phase imaging with the transport of intensity equation was implemented in the simulation. The retrieved phase image was almost the same as the original image of the sample.

IPp-02

Hardware-Awarded Computer Generation Hologram based on Phase Error

Dong-Woo Seo, Youngrok Kim, Chihyun In, Sung-Wook Min
Kyung Hee University

Hardware-Awarded hologram generation techniques compensate physical errors with iterative loop with optical reconstruction feedback. We propose an iterative hologram compensation method capturing the phase information and eliminating physical error.

IPp-03

Axial shaping of focused beam using a computer-generated hologram

Nami Kuroo, Yoshio Hayasaki
Center for Optical Research and Education (CORE), Utsunomiya University

Long-focused beam shaping which is indispensable for advanced functional laser processing is arbitrary and adaptively performed with a computer-generated hologram (CGH) displayed on a liquid-crystal on silicon spatial light modulator (LCOS-SLM).

IPp-04

Manufacturing a Holographic Cylindrical Vector Beam Converter

Jing-Heng Chen, Chien-Hung Yeh, Kun-Huang Chen
Feng Chia University

This study introduces a new holographic cylindrical vector beam converter using a circular polarization-selective volume hologram grating. The prototype, recorded with a specialized truncated cone prism and a radially polarized beam, demonstrated high efficiency, narrow bandwidth, compactness, and a planar configuration in testing.

IPp-05

Resolution Enhancement of Optical Scanning Holographic Microscopy

Chen-Hsiang Huang, Jung-Ping Liu
Feng Chia University

Based on the technique of optical scanning holography (OSH), optical scanning holographic Microscopy (OSHM) features three-dimensional (3D) imaging not only in the coherent mode but also in the incoherent mode. Here we discuss the method of resolution enhancement for OSHM by applying two spherical waves with opposite wave curvatures.

Poster Session <Exhibition Hall A>

Thursday, 25 April

IPp 13:30-15:00

IPp-06

One-shot color-encoded Fringe Projection for 3D Shape Measurements

Wei-Hung Su, Pei-Chi Li
National Sun Yat-sen University / Department of Materials and Optoelectronic Science

A method using color-encoded fringe projection to describe the profile of the dynamic object is presented. Accuracy of the presented method could be as high as those measured by a three-step phase-shifting technique.

IPp-07

Uniform imaging environment design for specular objects using elongated rectangular beam splitter

Hanjin Cho, Siwoo Lee, Minseok Chae, Juhyun Lee, Yoonchan Jeong, Byoungho Lee
Seoul national university

This paper proposes a novel optical design method to create a uniform imaging environment for objects with specular reflections using a dome, a rectangular bar light, and an elongated rectangular beam splitter.

IPp-08

Observation of ultrasound generated by a focused femtosecond laser pulse on a material using in-line Mach-Zehnder interferometer implemented with diffractive gratings

Kaede Yamauchi, Sotaro Komatsu, Yoshio Hayasaki
Utsunomiya University

Ultrasound is generated when a femtosecond laser pulse is focused on a material surface. The ultrasound contains useful information of laser irradiation condition, laser matter interactions, and fabricated structures. The ultrasound is measured by a Mach-Zehnder interferometer implemented with grating beam splitters, which has a feature of high stability against an external disturbance because of its in-line arrangement.

IPp-09

Pupil Expansion in Projection-type CGH Display with Scanning HOE Screen

Wen-Kai Lin[1], Shao-Kui Zhou[1,2], Chun-Chia Chen[1], Bor-Shyh Lin[2], Wei-Chia Su[1]
[1]National Changhua University of Education, [2]National Yang Ming Chiao Tung University

A see-through projection-type computer-generated hologram (CGH) display system with extended pupil for image observation is presented. The field of view (FOV) of the CGH display image is 21 degree. And a horizontal exit pupil with 50mm is achieved in our experiments.

IPp-10

Imaging performance of a bionic human eye model for emmetropic vision

Ssu-Chia He[1], Ching-Yao Huang[2], Han-Yen Tu[3], Chau-Jern Cheng[1]
[1]National Taiwan Normal University, [2]Dayeh University, [3]Chinese Culture University

We propose and develop a bionic human eye model with a liquid lens as crystalline lens for vision accommodation and characterize the imaging quality of the eye model to achieve the emmetropic eyes vision.

IPp-11

Lensless Computational Imaging Framework with Applications to Digital Holography

Yunhui Gao, Shuowen Li, Liangcai Cao
Department of Precision Instruments, Tsinghua University

The basic framework of lensless imaging is introduced and a spatiotemporally regularized inversion (STRIVER) method is presented. High-fidelity, motion-resolved, reference-free holographic imaging is achieved for dynamic scenes, pushing the temporal resolution toward higher limits.

IPp-13

Enhancing Fresnel Zone Aperture Encoded Lensless Imaging with Autofocusing Method

Fangyu Liu, Jiachen Wu, Liangcai Cao
Department of Precision Instruments, Tsinghua University

A method for high-quality reconstruction and autofocusing in Fresnel zone aperture (FZA) encoded lensless imaging is proposed. By examining the image sharpness on the back propagation, the accurate focusing distance and PSF considering diffraction can be calculated. Then we can use a TV regularization-based compressive sensing method to suppress the twin image.

IPp-15

A Proposed Method for Estimating Pufferfish piece Counting and Pufferfish Size Using a Single Convolutional Neural Network

Azu Murakami[1], Hiroki Takatsuka[1], Shiro Suyama[1], Masaki Yasugi[1,2], Hirotsugu Yamamoto[1]
[1]Utsunomiya University, [2]Fukui Prefectural University

We propose a method for estimating pufferfish piece counting and pufferfish size by using a single convolutional neural network. The piece counting has correct count in 56 images out of 100 images. Measurements were taken with respect to the size of the box in relation to the size of the fish. The most common bounding box size obtained from this measurement was between 0.05 and 0.1. This is 135 out of 344 total bounding boxes.

LDCp 13:30-15:00

LDCp-01

Grating-based AR display system with three-layer volume holographic lightguide

Chun-Chia Chen[1], Shao-Kui Zhou[1,2], Wen-Kai Lin[3], Ching-Cherng Sun[3], Bor-Shyh Lin[2], Wei-Chia Su[1]
[1]National Changhua University of Education, [2]National Yang Ming Chiao Tung University, [3]National Central University

An AR display system with large FOV based on three-layer volume holographic lightguide element is presented. Each layer of the volume holographic lightguide is designed to offer one-third FOV of the diffraction image. The horizontal FOV of the proposed system can reach 63.9°. Each in-coupler and out-coupler is generated with wavelength multiplexing to record three volume holographic gratings with different wavelength in the same device for color display.

LDCp-02

Investigation of human skin mechanics by using multimodal SHG, TPEF, and Brillouin scattering microscopy

Naoya Okubo[1], Eiji Hase[2], Yuki Ogura[3], Yu Tokizane[2], Takeo Minamikawa[2], Takeshi Yasui[2]
[1]Grad. Sch. Sci. Tech. Innov. Sci. Tokushima Univ., [2]Inst. Post-LED Photonics, Tokushima Univ., [3]Shiseido Global Innovation Center

We developed a multimodal optical microscopy system integrating second-harmonic-generation (SHG), two-photon excitation fluorescence (TPEF), and Brillouin scattering microscopy for *ex vivo* mechanical analysis of the human skin.

OMCp 13:30-15:00

OMCp-01

Study of the ultra-high oxide/oxide/metal/oxide four-layer transparent conducting electrodes deposited by low temperature sputtering

Dai-Mei Lin, Tai-Yuan Chen, Chia-Wun Dai, Guan-Ru Lin, Pin-Hsuan Hsu, Da-Xun Wang, Chia-Ching Wu
Department of Applied Science/National Taitung University

In this study, the transmittance of ITO/GZO/Ag/ITO four-layer electrode solving the problem of low transmittance in NIR range. The transmittance of ITO/GZO/Ag/ITO four-layer electrode is higher than the ITO/Ag/ITO sandwich structure in visible light and NIR range. A semitransparent spiro-OMeTAD/$CH_3NH_3PbI_2$/SnO_2/ITO perovskite solar cell with ITO/GZO/Ag/ITO four-layer electrode exhibits an photoelectric conversion efficiency of about 14%.

OMCp-02

Light induced motion in an intrinsically chiral metal cluster

Takuya Nakashima, Wataru Ishii
Osaka Metropolitan University

Metal clusters composed of specific numbers of metal atoms and ligands possess atomically precise structure. The photoexcitation of a metal cluster could induce a possible contraction motion in the excited state.

OMCp-03

Realization of Arbitrary Caustic Engineering via 3D-printed Metasurfaces

Xiaoyan Zhou[1,2,3], Hongtao Wang[2,3], Shuxi Liu[1], Hao Wang[3], John You En Chan[3], Cheng-Feng Pan[2,3], Daomu Zhao[1], Joel K. W. Yang[3], Cheng-Wei Qiu[2]
[1]Zhejiang University, [2]National university of singapore, [3]Singapore university of technology and design

By introducing the “compensation phase” via 3D-printed metasurfaces, we sculpt caustic fields with arbitrary propagation trajectories in free space. During propagation, the in-plane caustic patterns can either be preserved or morphed from one shape to another.

OMCp-04

Interaction between structured optical fields and two-dimensional materials for high-efficiency optoelectronic conversion

Xingzhan Wei
Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences

In this talk, we discuss our endeavors to improve the optoelectronic conversion efficiency of 2D materials-based detectors. This enhancement is achievable through the integration of nanostructured optical fields, utilizing either Au nanoparticle gratings, an Au nanoslit array, or a nanostructured silicon substrate.

Poster Session <Exhibition Hall A>

Thursday, 25 April

OMCp 13:30-15:00

OMCp-06

Spatial control of heat generation in metal nanostructures with high-order plasmonic modes

Kenji Setoura[1], Mamoru Tamura[2,3], Tomoya Oshikiri[4,5], Takuya Iida[3]
[1]Kobe City College of Technology, [2]Osaka University, [3]Osaka Metropolitan University, [4]Tohoku University, [5]Hokkaido University

We numerically demonstrated that the location of heat generation by photothermal conversion can be controlled by the excited plasmonic mode when using transition metals as plasmonic materials.

OMCp-07

Chirality Emergence of Organic Molecules induced by Circularly Polarized Lyman-alpha Light Irradiation and magnetic field application

Masahiro Kobayashi[1], Jun-ichi Takahashi[2], Hiroshi Ota[3], Koishi Matsuo[4], Gen Fujimori[5], Yoshitaka Taira[3], Masahiro Katoh[4], Kensei Kobayashi[5,6], Yoko Kebukawa[6], Hiroaki Nakamura[1]
[1]National Institute for Fusion Science, [2]Doshisha University, [3]Institute for Molecular Science, [4]Hiroshima University, [5]Yokohama National University, [6]Tokyo Institute of Technology

Solid film of racemic amino acid (DL-alanine) was irradiated by circularly polarized Lyman-alpha light in UVSOR-III, to investigate a cosmic scenario of the origin of the homochirality of terrestrial biomolecules. Optical activity emergence was clearly observed in the circular dichroism spectrum measured at HiSOR. Effects of magnetic field application is also discussed.

OMCp-08

Structural transitions between achiral and chiral crystal structures toward understanding the exchange of angular momentum between light and matter

Ryusei Oketani, Musashi Okada, Ichiro Hisaki
Osaka University

We will report that achiral crystal structures of a phenothiazine derivative, which exhibit planar chirality in solid, undergo a SC-SC structural transition to a chiral structure upon heating. Furthermore, when a single crystal with known chirality is brought into contact at the structural transition temperature, a structural transition accompanied by chirality transcription was observed.

OMCp-09

The structure and stability of molecules in condensed systems: interactions with the surrounding environment and electromagnetic fields

Hirofumi Sato[1], Yuji Takabayashi[1], Kosuke Imamura[1], Daisuke Yokogawa[2]
[1]Kyoto University, [2]The University of Tokyo

The structure of polyatomic molecules in condensed systems was studied based on quantum chemistry and statistical mechanics.

OMCp-10

Controlling bacterial collective motion by liquid crystal droplets rotating in a polarized light beam

Kaito Matsuura, Keita Saito, Yasuyuki Kimura, Yusuke Maeda
Kyushu University, Department of Physics

Swimming micro-organisms such as bacteria are known to exhibit turbulent collective motion with increasing density. In this study, we constructed a forced flow field in which liquid crystal droplets are rotated by a circularly polarized light beam to control bacterial turbulence.

OMCp-11

Broad-Spectral-Bandwidth, High-Absorbance Germanium Infrared Photodetector at the 1550 nm Wavelength by the Subwavelength Phase-Tunable Grating

Ching-Yu Hsu[1], Zingway Pei[2], Jia-Ming Liu[3]
[1]National Yang Ming Chiao Tung University, [2]National Chung Hsing University, [3]University of California, Los Angles

A novel Ge infrared photodetector with a subwavelength phase-tunable grating and resonant-cavity-enhanced structure achieves over 60% absorbance (1428 nm to 1567 nm). At 1550 nm, absorbance reaches 69.86% with a 390-nm thin Ge layer.

OMCp-12

Combination of Photoluminescent Dyes and Artificial Molecular Machines Affords Upgraded Photofunctions

Ryojun Toyoda
Tohoku University

A photoluminescent dye and a molecular machine are combined in a single molecule and in a liquid crystal device, resulting in synergistic photofunctions and programmed modulation of circularly polarized light.

OMCp-13

Selective Optical Manipulation of Nanoparticles for Emission Lines Using Stimulated Recoil Force

Takao Horai[1], Takudo Wada[2], Yoshiki Saito[1], Yuto Makino[1,3], Masaaki Ashida[1], Hajime Ishihara[1]
[1]Osaka University, [2]Osaka Prefecture University, [3]Daicel Corporation

We propose an optical manipulation method to selectively target a particular emission line by using the recoil force generated when irradiating materials with induced light under their inverted-occupation conditions. We evaluated this force using a four-level system and performed a kinetic analysis to demonstrate emission-line selective manipulation.

OMCp-14

Fast stroboscopic switching of an optical force acting upon a levitated nanoparticle

Martin Duchan[1], Martin Šiler[1], Petr Jákl[1], Oto Brzobohatý[1], Radim Filip[2], Pavel Zemánek[1]
[1]Institute of Scientific Instruments of the CAS, v. v. i., Královopolská 147, 612 00 Brno, Czech Republic, [2]Department of Optics, Palacký University, 17. listopadu 1192/12, 771 46 Olomouc, Czech Republic

We demonstrate an experimental procedure based on a repetitive and sub-microsecond switching of the trapping laser intensity which leads to the squeezing of the phase space probability density distribution of the levitated nanoparticle in vacuum.

TILA-LICp 13:30-15:00

TILA-LICp-01

Multi-Joule pulses delivered by a gradually doped tiny integrated solid-state laser operated at room temperature

Vincent Yahia[1,2], Arvydas Kausas[2,1], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center

A two-stages room-temperature diode-pumped laser amplifier has been developed. Using a modular gain medium with step-like doping concentration distribution, the system could deliver 2.6J subnanosecond pulses at 10Hz repetition rate. A distributed face cooling gain medium is currently developed to allow operation up to 100Hz.

TILA-LICp-02

Characterization of crystal quartz for QPM-NLO device

Hideki Ishizuki[1,2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Inst. Mol. Science

Crystal quartz is expected for material of high-intensity QPM device. Characterization of various quartz were compared in VUV and MIR range. Quartz property and polarity-inversion characteristics are discussed.

TILA-LICp-03

Buried depressed-cladding waveguides inscribed in Nd:YAG ceramics by picosecond-laser beam writing

Gabriela Croitoru, Florin Jipa, Nicolaie Pavel
National Institute for Laser, Plasma and Radiation Physics

Buried depressed-cladding waveguides were inscribed in 1.1-at.% Nd:YAG ceramic using the direct writing technique with a picosecond-laser beam. Laser emission at 1.06 μm and 1.32 μm was obtained under quasi-continuos-wave pumping with fiber-coupled diode lasers.

TILA-LICp-04

Thermal expansion coefficient of YAG ceramics adopted with various kinds of dopant-ions

Yoichi Sato[1,2], Takunori Taira[1,2], Tomohisa Takemasa[3]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science, [3]Konoshima Chemical Co., Ltd.

Thermal expansion coefficients of YAG ceramics doped with Nd^{3+}, Yb^{3+}, Er^{3+}, Sm^{3+}, and Cr^{4+} ions were evaluated from -150 °C to 700 °C. Measured thermal expansion coefficient of various kinds of YAG ceramics were coincided to Nd:YAG single crystals, and no significant differences depending on dopants were detected.

TILA-LICp-05

Study of laser induced damage evaluation for crystals

Akihiro Osanai[1], Arvydas Kausas[1,2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science

The local inhomogeneity of crystals used for laser oscillation influences the laser damage resistance and it may mislead us about materials evaluation. We considered evaluation methods for crystals having local inhomogeneity and applied experimental data.

What's Happening in the Exhibition Hall?

OPTICS & PHOTONICS International Exhibition 2024 (OPIE'24)

In 1994, The Laser Society of Japan initiated LASER EXPO, which consists of seven optics-related EXPOs; LENS EXPO (Design & Manufacturing), Positioning EXPO, Light Sources & Optical Devices EXPO, Space & Astronomical Optics EXPO, Sensor & Imaging EXPO, and Optical Communication & Applications EXPO.
This is now the leading Asian event for advancing optical solutions.
Make time in your day to visit the exhibit hall, which features a diverse group of companies, representing every facet of the optics and photonics industries.
Learn about new products, find technical and business solutions and gain the most up-to-date perspective of the laser-related business environment.
Review the extensive list of exhibitors below to see who you'll meet at OPIE'24.
There is no charge to attend the exhibit for conference registrants and exhibit-pass only visitors.

Highlights

24 April 10:30-11:15 at 2F Concourse E26
Emerging applications for CO_2 laser based optical fiber glass processing
Erik Böttcher, CEO Nyfors Teknologi AB / Japan Laser Corporation

25 April 13:30-14:15 at 2F Concourse E26
High Performance Interferometers for qualifying complex optical components and optical systems
Donald A. Pearson II, Vice President Sales & Global Operations Apre Instruments / Canon Marketing Japan Inc.

25 April 14:30-17:00 at 2F Concourse E25
Photonics and Sensing Innovation from Thuringia and Berlin. Opportunities for Cooperation.

Welcome by Moderator
Pascal Gudorf, Representative, State Development Corporation of Thuringia (LEG)
Introduction by Wolfgang Tiefensee, Thuringia's Minister for Economic Affairs, Science and Digital Society

Japan's Photonics Industry: Overview and Outlook
Prof. Yoshimasa Kawata, President of the Optical Society of Japan, Vice President, Shizuoka University
Keynote 1: Thuringia and Japan: Partnering for Innovation in Optics, Photonics and Electronics
Anke Siegmeier, Managing Director, OptoNet e.V.
Keynote 2: Photonics in Berlin Brandenburg
Prof. Dr. rer. nat. Martin Schell, Executive Director, Fraunhofer Heinrich-Hertz-Institute
Keynote 3: Quantum Innovation for Transport Applications (example)
Hirotaka Irie, Denso Corp.

Pitches on Photonics, Sensing and Quantum Optics
Fraunhofer Heinrich-Hertz-Institut
Photonics for Communication, Sensing, and Quantum Technologies
Dr. Dominic Schulz, Head of Strategy Photonics
ADL Optica
Multi-focus and Laser Beam Shaping Optics
Dr. Alexander Laskin, CEO
Asphericon
Democratization of Laser Technology: A Journey of Unlimited Opportunities
Sebastian Henkel, Head of Global Sales & Procurement
FBGS Technologies GmbH
Infinity Scan – Endless Monitoring Possibilities
Daniel Matz, Sales Manager EMEA
Fraunhofer Institute for Applied Optics and Precision Engineering IOF
Photonics - Enabler for Quantum Technologies
Dr. rer. nat. Ramona Eberhardt, Senior Director / Deputy Director, Head of Department Emerging Technologies
Micro-Hybrid Electronic GmbH
Infrared Components for NDIR Gas Sensing & Remote Temperature Measurement
Heiko Richter, Senior Key Account Manager

VPIphotonics
Photonic Simulation Software for Engineering and Research
Dr. André Richter, CEO
Tokai Optical Co., Ltd.
Presentation title (tbc)
Muneo Sugiura, Ph.D., Optical Products Division

Exhibitor List

3D Innovation
ABEL
ActesKyosan
Adachi New Industrial
AdlOptica Optical Systems
Advanced Communication Media
AGC
Agilent Technologies Japan
AIM
AISAY
AITEC SYSTEM
AK CORPORATION
AkiTech LEO
Alnair Labs
ALT
Altechna
ALXIS DATA
AMAKUSA OPTICAL
AMETEK
AMPLITUDE JAPAN
Anhui Crystro Crystal Materials
ANRITSU
Ansys Japan
APL MACHINE INDUSTRIAL
Aptus
Archer OpTx
ARTRAY
Asahi Diamond Industrial
ASAHI RUBBER
Asahi Spectra
ASKK
asphericon
Association for Innovative Optical Technologies
AUTEX
AVAL DATA
AYASE
Baikowski Japan
Beams
Berlin Partner for Business and Technologie
BITRAN
BOOK Fair
BPF laser innovation
Broadcom / Silicon Technology
Bunkoukeiki
Camerium
Canare Electric
Canon Marketing Japan
CARLBASSON
CASTECH
CBC Optics
CBS Japan
CERATECH JAPAN
Changchun Boxin Photoelectric
Changchun New Industries Optoelectronics Tech
Changchun Worldhawk Optoelectronics
Chroma Technology Japan
CHRONIX
Chuo Precision Industrial
CIOE
Circle & Square
COMSOL
Consortium of Visible Laser Diode Applications
CoreMorrow
Craft Center SAWAKI
CRYSLASER
CRYSTAL OPTICS
Cybernet System
Daicel
Danyang Danyao Optics
DELTAOPTICS
DHT
DON
Dongguan Changyi Optoelectronics
Dongguan Harmony Optical Technology
e.x.press
ECOPTIK (CHANGCHUN)
EDMUND OPTICS JAPAN
EKSMA Optics
ElFys
Enable
EPIC
Exail
EXSEAL
FBGS Technologies
FiberLabs
FIT
FIT Leadintex
Fraunhofer HHI
FSK
Fujian Hitronics Technologies
FUJII OPTICAL
Fujitok

G-Freude
GIAI PHOTONICS
GIP Technology
GLORY
Gooch & Housego
Graviton Incorporated
Guangdong Hall Laser Technolohy
HAGITEC
Hakuto
Hamamatsu Agency for Innovation, Photon Vallery Center
HAMAMATSU PHOTONICS
HAMAMATSU QUANTUM
HANAMURA OPTICS
Hangzhou ZhiDa Electro-Optical
Hellma Materials Japan
Henan UM Optics
HighFinesse Japan
Hikari
HIKARI GLASS
Hitachi High-Tech Science
HORIBA
HOTTA Optical
HUBEI GABRIELLE-OPTECH
Hubei New HuaGuang Information Materials
Huber Diffraktionstechnik
Iida Lighting.
IIYAMA PRECISION GLASS
Innovation Research
INNOVENT
Institute for Laser Technology
Institute of Laser Engineering, Osaka University
INTELLEKTUAL'NYE SISTEMY NN
IR System
Iridian Spectral Technologies
IROYAL TECHNOLOGY
ISUZU GLASS
Itabashi Industrial Promotion Public Corporation
ITOH OPTICAL INDUSTRIAL
I-Wave
Japan DEVICE
Japan Guanghe Optics
JAPAN IMPORTERS ASSOCIATION OF LASERS & ELECTRO-OPTICS
Japan Intense Light Field Science Society
Japan Laser
Japan Optical Glass Manufacturers' Association
JAPAN OPTICAL MEASURING INSTRUMENTS MANUFACTURERS' ASSOCIATION
JAPAN OPTOMECHATRONICS ASSOCIATION
Japan Photonics Council
Japan Precision Measuring Instruments Manufacturers Association
Jiangsu Haona Optical
JIANGSU YUDI OPTICAL
JiangXi Trace Optical
Jinan Bodor CNC Machine
JTEC
JURARON INDUSTRIES
KADOMI OPTICAL INDUSTRY
Kanagawa Institute of Industrial Science and Technology
Kantum Ushikata
Kato Seiko
KAWAI OPTICS
Ken Automation
Keysight Technologies
KEYSTONE International
KIMMON KOHA
KIYOHARA OPTICS
KLV
Kogakugiken
KOJIMA ENGINEERING
KOSHIBU PRECISION
KUNMING METWHICH OPTICAL
KYOCERA
KYOCERA SOC
KYOKUEI-KENMAKAKOU
KYORITSU ELECTRIC
KYORITSU SEIKI
LAYERTEC
LCPT
LEADER ELECTRONICS
Lidaris
Light Conversion
LightBridge
LinkOptics
LINX
LITEK Lithuanian Laser Association
LogistLab
LUCEO
LUMIBIRD
Luminex Trading
LxRay
MABUCHI S&T
MARUBUN
MATSUNAMI GLASS IND.
MB SMART
MEJIRO GENOSSEN
Menlo Systems
Merck Performance Materials
MESS-TEK
MFOPTEX
Micro Edge Process
Micro-Epsilon Japan
Micron
Microoptics Group, The Japan Society of Applied Physics
MICROTECH LABORATORY
MORITA OPTICS
MSA Factory
MSH systems
Nalux
Nanjing April Electro-optics
Nanjing Sapphire Electro-Optics
Nanyang Lida Optic-electronics
Nanyang Srate Optical Instrument
National Astronomical Observatory of Japan
National Institute of Information and Communications Technology
Natsume Optical
NEOARK
Neotron
Neutrik
NIHON KESSHO KOGAKU
NIHON KOSHUHA
Nihon Synopsys
Niko Optics
Nippon Electric Glass
NISSIN KIKAI
NITTO OPTICAL
Nittoh
NTKJ
NTT Advanced Technology
Ocean Photonics
OCJ / Optical Coatings Japan
OE GIKEN
OHARA
Ohyo Koken Kogyo
Oji Holdings
Okamoto Machine Tool Works
OKAMOTO OPTICS
OPI
OPT CAREER
OPTICA (Formerly OSA)
OPTICAL SOLUTIONS
Optime Technology (Beijing)
OPTO SCIENCE
Optoelectronics Industry and Technology Development Association
Optogama
Opto-Line
OPTOMAN
Optopia
OPTOQUEST
OptoSirius
OptoTech optikmaschinen
Optronics
Optronscience
Orbray (Formerly: Adamant Namiki Precision Jewel)
Orsa
OtO Photonics
OXIDE
OZ Optics
Panasonic Factory Solutions Sales & Engineering Japan
PEARL OPTICAL INDUSTRY
Phenix Optics
Phi Microtech
PHOTOLEX
Photonic Sensing Consortium for Safety and Security
Photonicore Technologies (PCT)
Photonics Cluster Berlin Brandenburg
Photonics division, The Japan Society of Applied Physics
Photonics Media
Photonques
PHOTOTECHNICA
Physix Technology
Pi PHOTONICS
PI-Japan
Plastic Optical
PNEUM
Polaris
PolyPhotonics Berlin
Power Laser DX Platform
Primetech Engineering
Prior Scientific
PROFITET
PULAX
Pulstec Industrial
QD Laser
QED Technologies International
Qingdao NovelBeam Technology
QS Lasers
Quantum Design Japan
Quantum Light Instruments
Quark Technology
RAY-MOTION
Rayture Systems
REVOX
RF Materials
Rinks Web
Ryokosha
S.G.K.
SAIS
Sakai Manufacturing
SANKEISHA
Santec
Santek International
SCANSOL
Scintacor
SEIKOH GIKEN
Seiwa Optical
sevensix
Shanghai Bright Photonics
Shanghai Ephoton Optoelectronics Technology
SHANGHAI MAGNITY ELECTRONICS
Shanghai Onunion Technology
Shanghai Yanding Tech
Shenzhen Bosen Optoelectronics Technology
Shenzhen Dehong Vision Technology
SHENZHEN OANDE TECHNOLOGY
SHERN YEONG PRECISE OPTICAL
SHIBAURA MACHINE
Shibuya Optical
Shikoh Tech
Shimadzu
SHINANO SEIMITSU
SiChuan JUKA Optical Technology
Sinko
SINO-GALVO (JIANGSU) TECHNOLOGY
Sjllaser Technology
SK Fine
SoftWorks
Soltec
Space Photon
Spectral Application Research Laboratory
SPIE
SPRING RAINBOW OPTICS
State Development Coproration of Thuringia
Study Group of Optical Wireless Power Transmission
Success Optics
SUMITA OPTICAL GLASS
Sumitomo Electric Industries
Sun Instruments
Sunny Japan
SunPlus Trading
SURUGA SEIKI
Suzhou Everbright Photonics
Systems Engineering
T.E.M.
T.S.L.
TAC COAT
Tachibana Optical Lens
TACMI CONSORTIUM
TAI YEE OPTICAL
Taihei Boeki
TAISEI
Taisyou Optical
TAKAHATA PRECISION
TAKENAKA OPTONIC
TAKENAKA SYSTEM
Takeuchi Manufacturing
TANAKA ENGINEERING
Tatsuno Optics
Technical
Technohands
TECNISCO
Teledyne Photometrics
Teledyne SP devices
THE AMADA FOUNDATION
The Graduate School for the Creation of New Photonics Industries
The Institute of Electronics, Information and Communication Engineers
The Institute of Image Information and Television Engineers
The Institution of Professional Engineers, Japan
The Japan Society for Precision Engineering
The Japan Society of Applied Physics
The Laser Society of Japan
The Optical Society of Japan
The Optical Thin-Film Science and Engineering group
The Robotics Society of Japan
The Spectroscopical Society of Japan
Thermo Graphitics
THK PRECISION
Thorlabs Japan
TOEI Denka Kogyo
TOHOKU ELECTRONIC INDUSTRIAL
Tokai
Tokai Engineering Service
TOKAI OPTICAL
TOKAI OPTICAL HOLDINGS
TOKYO DENSHI KOGYO
Tokyo Instruments
TOKYO SEIKI KOSAKUSHO
TOPCON
TOPTICA Photonics
Toshiba Teli
TOUMEIGIKEN
TOYO CHEMICAL
Trioptics Japan
TRUMPF
Trusee Technologies
TSUBOSAKA ELECTRIC
TSURUMARU
Ultraviolet Technology
UNION OPTICAL
Uniopt
UNITAC
UNIVERSE OPTICAL INDUSTRIES
USA - Montana
USHIO
U-TECHNOLOGY
Vision Sensing
VPIphotonics
WARP TECH
WAVE OPTO
WORKS
Xi'an SNP Precision Optics
YACHIYO MICROSCIENCE
YAMAMOTO KOGAKU
Yokogawa Test & Measurement
Yucaly Optical Laboratory
Yuridenki-Shokai
Yutong Optical Technology
ZheJiang Best Optoelectronic
ZHEJIANG LANTE OPTICS
Zolix Instruments

Amplitude

High Power Ultrafast Lasers

More information at amplitude-laser.com

PULSAR TW/PW

PW > 1 shot / mm to 1 Hz
From > 0,5 PW to > 1 PW

TW > From 5 to 10 Hz
From > 60 TW to > 250 TW

Ideal for

> Laser Wakefield Acceleration
> Protontherapy
> High Harmonic Generation, XUV and Attoscience
> And many more....

TITAN

> Up to 5 Hz
> 6J – 532 nm and 12J – 532nm
> Quasi top-hat beam profile
> Very compact footprint

Ideal for

> Laser peening
> Ti:Sapphire pumping for TW and PW Laser Systems
> LIDT test
> And many more....

JLC JAPAN LASER 株式会社日本レーザー

URL: https://www.japanlaser.co.jp/ E-mail: jlc@japanlaser.co.jp
東京本社 東京都新宿区西早稲田2-14-1 TEL 03-5285-0861 FAX 03-5285-0860
大阪支店 大阪市東淀川区東中島1-20-12 TEL 06-6323-7286 FAX 06-6323-7283
名古屋支店 名古屋市中区錦3-1-30 TEL 052-205-9711 FAX 052-205-9713