

LSSE

Monday, 19 April

[LSSE-1] 13:00-15:05
Keynote 1 Anti COVID 1
 Chair: Toshikazu Ebisuzaki
 RIKEN

LSSE-Opening 13:00
Opening Remarks

LSSE-1-01 13:05 *Keynote*

Rapid Detection system for new coronavirus

Yoshihide Hayashizaki
 RIKEN Preventive Medical Innovation Program

The key to recovering economic activity from the long-term period of Covid19 pandemic is how to safely hold events, transportation, meetings, and so on. We have developed a system that can detect the new coronavirus in about 20 minutes. An important point in conducting a test for new coronavirus is to perform a time-stamped snapshot test. In my speech, I would like to introduce a few examples of our experiences to prevent cluster formation.

LSSE-1-02 14:05 *Invited*

Kaitech's photocatalytic technology efforts to address global environmental issues

Junichi Somei
 Kaitech Corporation

Kaitech's photocatalytic technology has been demonstrated to be effective against the novel coronavirus through joint research with RIKEN and Nihon University School of Medicine. Apply photocatalytic technology to water purification as well as air purification. Photocatalysts discovered by Japanese researchers about 50 years ago contribute to global environmental problems, including pandemics.

LSSE-1-03 14:35 *Invited*

Simultaneous laser measurement of the velocity and size of speech-generated droplets

Takeharu Murakami, Norihito Saito,
 Takayo Ogawa, Katsuhiko Tsuno,
 Michio Sakashita, Satoshi Wada
 RIKEN

We propose a method that combines orthogonal Particle Tracking Velocimetry and Interferometric Mie Imaging to measure the velocity vector and size of speech droplets simultaneously.

[LSSE-2] 15:30-17:00
Keynote 2 Anti COVID 2
 Chair: Satoshi Wada
 RIKEN

LSSE-2-01 15:30 *Keynote*

Light-based disinfection for SARS-CoV2

Yoko Aida¹, Ryosuke Matsuura Matsuura³,
 Chieh-Wen Lo¹, Junichi Somei⁴,
 Heihachiro Ochiai¹, Kazuo Iimura⁵,
 Masaru Nakazawa¹, Masami Takei³,
 Yosimi Benno², Takeharu Murakami²,
 Norihito Saito², Takayo Ogawa²,
 Aitsushi Shinjo², Satoshi Wada²
¹The University of Tokyo, ²RIKEN, ³Nihon University School of Medicine, ⁴Kaitech Co., LTD, ⁵Farmroid Co., LTD

Light-based technologies, such as LED-TiO₂ photocatalytic reaction and UVC light, effectively inactivate SARS-CoV-2 by different mechanisms. Therefore, these tools could potentially save people from the risk of infectious diseases.

LSSE-2-02 16:30 *Invited*

The effect of the UV sterilization robot UVBuster on the SARS-CoV2

Kazuki Iimura^{1,2}, Masami Takei³, Yasuhiro Gon³, Takeshi Sakamoto⁴, Satoshi Wada^{2,5}

¹FARMROID Co., Ltd., ²Division of Hematology and Rheumatology, Department of Medicine, Nihon University School of Medicine, ³Division of Respiratory medicine, Department of Medicine, Nihon University School of Medicine, ⁴Itabashi City, ⁵Photonics Control Technology Team, RIKEN Center for Advanced Photonics
 The SARS-CoV-2 RNA in the pharyngeal swab sample collected from the patient was destroyed by 254 nm UVC from the UV irradiation robot. In order to investigate the virus destruction mechanism by UV rays in detail, we set the UV irradiation time conditions to 5 seconds, 15 seconds, and 30 seconds in the P3 laboratory, and conducted infection experiments using two types of PCR methods and Vero cells.

Tuesday, 20 April

[LSSE-3] 10:30-11:30
Space Technology 1
 Chair: Toshikazu Ebisuzaki
 RIKEN

LSSE-3-01 10:30 *Invited*

Simulation of Laser Beam Propagation in the Atmosphere

Yoshiaki Kato, Toshikazu Ebisuzaki,
 Tomohiro Tsukihana, Naoto Sakaki
 RIKEN

We report on simulations of thermal blooming effect by high-power laser in the atmosphere.

LSSE-3-02 11:00 *Invited*

1-kW Fiber Laser Beam Propagation in Water Vapor

Tomohiro Tsukihana
 RIKEN

1-kW fiber laser at 1070nm was used to study the thermal blooming effect in water vapor. Specifically, the thermal blooming dependence on water-vapor absorption has been elucidated.

[LSSE-4] 15:30-17:00
Space Technology 2
 Chair: Toshikazu Ebisuzaki
 RIKEN

LSSE-4-01 15:30 *Invited*

Atmospheric Turbulence Measurement Experiments Using Backscattering for Predictive Adaptive Optics Control

Takuya Noritake¹, Masashi Iwashimizu¹, Shingo Nishikata¹, Hiroyuki Daigo¹, Toshikazu Ebisuzaki², Naoto Sakaki², Tomohiro Tsukihana², Seiji Taniguchi³, Masayuki Fujita³, Haik Chosrovjan³

¹Mitsubishi Heavy Industries, Co., Ltd., ²Riken Institute, ³Institute for Laser Technology
 In order to realize high efficiency laser transmission, we must avoid atmospheric effects. This paper presents predictive adaptive optics control, which utilize backscattering of atmosphere and an absorption coefficient detector and the result of field experiments to take the atmospheric turbulence from backscattering.

LSSE-4-02 16:00 *Invited*

End-of-Life Deorbit Service with a Pulsed Laser Onboard a Small Satellite

Tadanori Fukushima^{1,2}, Daisuke Hirata^{1,2}, Kazuma Adachi^{1,2}, Yuki Itaya^{1,2}, Jun Yamada¹, Katsuhiko Tsuno², Takayo Ogawa², Satoshi Wada², Toshikazu Ebisuzaki²
¹SKY Perfect JSAT, ²RIKEN

In order to removal debris(nonfunctional satellite), SKY Perfect JSAT Corporation has begun designing a brand-new end-of-life (EOL) deorbit service satellite. The Corporation aims to launch a demonstration satellite in 2024 to start service in 2026.

LSSE-4-03 16:30 *Invited*

Machine Learning for processing of space images

Antonio Montarano¹, M. E. Bertaina², T. Ebisuzaki³
¹Politecnico di Torino, ²The University of Turin, ³Riken

Machine Learning represents a powerful technique to recognize space images. We focused on a new approach that could be applied for any object moving linearly or with a known trajectory in the field of view of a telescope. We will report on the expected performance of our approach based on simulated space debris tracks and we will provide insights on how this strategy could be applied also as online trigger alert.

Wednesday, 21 April

[LSSE-5] 10:00-11:20
Industrial Application 1
 Chair: Noboru Hasegawa
 QST

LSSE-5-01 10:00 *Invited*

Proposal of Phase Shift Optical Pulse Interference Seismograph and its Installation for Monitoring the Decommission of Fukushima Daiichi Nuclear Power Plant

A. Nishimura¹, H. Morishita², M. Yoshida²
¹JAEA, ²Hakusan Corp.

A phase shift optical pulse interference (PSOP) sensor was tested to observe the vibration characteristics a cylindrical water tank in order to apply the seismic safety management for social infrastructure.

LSSE-5-02 10:30

Water Tank Window Vibration Characteristics due to Water Level by Laser Vibration Displacement Measurement and its Application

Akihiko Nishimura¹, Tomonori Yamada^{1,2}, Yoshinori Shimada³, Hideki Morishita⁴, Minoru Yoshida⁴

¹Japan Atomic Energy Agency, ²Wakasa Wan Energy Research Center, ³Institute of Laser Engineering, ⁴Hakusan Corp.

In JAEA-NARAHA, vibration Characteristics of a water tank due to water level rising is measured. Laser Doppler vibration displacement sensor is used. This technique can be applied for monitoring internal pressure of a shielded radioactive material capsule.

LSSE-5-03 10:50 *Invited*

Laser-Induced Elastic Wave Methods for Inspection of Civil Infrastructure and Damage Detection in Concrete

Katsufumi Hashimoto, Tomoki Shiotani
 Kyoto University

This study aims to apply elastic wave excitation technique with laser impact method to non-destructive inspection for detecting damage and defect in concrete of civil infrastructures.

[LSSE-6] 13:50-15:00
Agri-Photonics 1
 Chair: Takayo Ogawa
 RIKEN

LSSE-6-01 13:50

Noninvasive quantitative prediction of functional ingredient in apple using Raman spectroscopy and multivariate calibration

Kouhei Saitoh¹, Akinori Taketani², Takeharu Murakami², Michio Sakashita², Saki Miyajima², Takayo Ogawa², Satoshi Wada², Hayato Maeda³, Yasutaka Hanada³

¹Hirosaki University The graduate school of Science and Technology, ²RIKEN Center for Advanced Photonics, ³Hirosaki University The graduate School of Agriculture and Life Sciences

We present prediction of a functional ingredient in apple using Raman spectroscopy combined with multivariate calibration analysis. The method reveals great potential for rapid and nondestructive analysis of the ingredient.

LSSE

Wednesday, 21 April

LSSE-6-02 14:10 *Invited*

Open the door into the microbial world by single-cell analysis

Haruko Takeyama^{1,2,3}
¹Department of Life Science and Medical Bioscience, Waseda University, ²Computational Bio Big-Data Open Innovation Laboratory, AIST-Waseda University, ³Research Organization for Nano & Life Innovation, Waseda University
 We have developed a platform for screening beneficial microbiomes and acquiring high-quality draft genomes at the single-cell level by a combination of droplet microfluidics and micro-Raman spectroscopy.

LSSE-6-03 14:40

Tentative
 Yasukazu Nakamura
 National Institute of Genetics

[LSSE-7] 16:00-17:00

Agri-Photonics 2
 Chair: Kohsuke Chris Yamada
 AOI-PARC

LSSE-7-01 16:00 *Invited*

Light effects on Spirulina platensis

Shy Chyi Wuang
 Temasek Polytechnic
 Spirulina platensis is widely used as health supplements. In this study, we investigated the effects of light spectrum on the growth and carotenoids accumulation in the cyanobacteria.

LSSE-7-02 16:30 *Invited*

Measuring and understanding plants to improve performances: Photonic sensors in large scale research infrastructure for plant sciences

Rick van de Zedde, Gerrit Polder
 Wageningen University & Research (WUR)
 The focus in this talk is to give insights and discuss the photonics sensors/ imaging systems that are used in the 6 modules of the Netherlands Plant Eco-phenotyping Centre (NPEC), for instance hyperspectral imaging systems to scout for diseases on field mounted on a field phenotyping tractor.

[LSSE-8] 10:00-11:30

Mourning session for Dr. Shimada (ILT), who made a great contribution to the field of laser remote sensing 1

Chair: Noboru Hasegawa
 QST

LSSE-8-01 10:00 *Invited*

Development of non-destructive inspection method for concrete elements in tunnel linings using laser remote sensing

Yoshiaki Oka
 West Japan Railway Company
 West Japan Railway Company and the Institute for Laser Technology jointly developed a laser remote sensing system as an alternative to the impact acoustics method for detecting defective concrete elements in tunnel linings.

LSSE-8-02 10:30 *Invited*

Development and Application of Laser-Based Inspection Technique for Concrete Structure

Shinri Kurahashi, Oleg Kotyaev, Yoshinori Shimada
 Institute for Laser Technology
 I will introduce the history of the development and progress of remote inspection technology using lasers that Dr. Shimada has been working on and report the work in recent years.

LSSE-8-03 11:00 *Invited*

In memory of research and development of Laser directive noncontact diagnosis for maintaining degraded infrastructure (SIP) project with Dr. Shimada

Kiwamu Kase
 RIKEN
 Memories of the research and development of Laser directive noncontact diagnosis for maintaining degraded infrastructure (SIP) project with Dr. Shimada is addressed.

[LSSE-9] 13:00-15:00

Mourning session for Dr. Shimada (ILT), who made a great contribution to the field of laser remote sensing 2

Chair: Takashi Fujii
 The University of Tokyo

LSSE-9-01 13:00 *Invited*

Soundness of heated concrete samples characterized by a laser driven ultrasonic technology

Tomonori Yamada^{1,2}, Hiroyuki Daido^{3,2}, Takuya Shibata²
¹WERC, ²JAEA, ³ILT
 We have demonstrated a full noncontact laser technology to measure the velocity of ultrasonic waves and their spectra propagated through degraded concrete samples exposed to specified high-temperature conditions.

Thursday, 22 April

LSSE-9-02 13:30 *Invited*

High power laser generated fine particles and fragments in laser processing

Hiroyuki Daido^{1,2}, Tomonori Yamada^{2,4}, Chikara Ito², Masabumi Miyabe², Takuya Shibata², Hiroyuki Fukukawa¹, Stephen Wells³, Shuichi Hasegawa³
¹Institute for Laser Technology, ²Japan Atomic Energy Agency, ³The University of Tokyo, ⁴The Wakasa Wan Energy Research Center
 We describe and investigate the production of particles and fragments from laser irradiated materials and their dispersion during laser processing. Observation of the dynamical processes as well as a morphological investigation were performed with a shadowgraph technique and an electron microscope. These studies will contribute to decommissioning of nuclear facilities as well as a variety of high power laser applications.

LSSE-9-03 14:00 *Invited*

Laser Hammering Method for Initial Stability Diagnosis of Pedicle Screw in Human Body

Katsuhiro Mikami¹, Daisuke Nakashima², Noboru Hasegawa³, Toshiyuki Kitamura³, Masaharu Nishikino³, Takeo Nagura²
¹Kindai University, ²Keio University, ³National Institutes for Quantum and Radiological Science and Technology
 Laser hammering method is one of the effective laser sensing scheme. In this study, we adapted the scheme to medical field for stability diagnosis of orthopedic implants.

LSSE-9-04 14:30 *Invited*

Social Implementation for the Laser Hammering System

Noboru Hasegawa¹, Masaharu Nishikino^{1,2}, Hajime Okada^{1,2}, Shuji Kondo^{1,2}, Toshiyuki Kitamura^{2,1}, Shigeru Kogure², Satoshi Tomoto³
¹National Institutes for Quantum and Radiological Science and Technology, ²Photon-Lab. Co., Ltd., ³CTI Engineering Co., Ltd.
 We are developing and implementing in society a remote non-destructive sensing system for concrete, Laser Hammering System (LHS). Several trial works are already performed in road tunnels, and establishment an operation method for effective utilization is in progress.

[LSSE-10] 16:00-16:50

Industrial Application 2

Chair: Akihiko Nishimura
 Japan Atomic Energy Agency

LSSE-10-01 16:00

Influence of friction in bolt loosening inspection based on laser hammering method

Yuka Okamoto¹, Katsuhiro Mikami¹, Natsumi Sudo¹, Noboru Hasegawa², Masaharu Nishikino²
¹Kindai University, ²National Institutes for Quantum and Radiological Science and Technology Kansai Photon Science Institute
 Laser hammering method can adapt into bolt loosening inspection. In this study, we evaluated the influence of friction in laser hammering method by measurement of the axial force.

LSSE-10-02 16:20

Remote diagnostics of composite insulator using laser-induced breakdown spectroscopy

Takashi Fujii¹, Taisei Homma¹, Akiko Kumada¹, Hiroya Homma², Yuji Oishi²
¹The University of Tokyo, ²Central Research Institute of Electric Power Industry
 We describe the results of depth profiling of the surface degradation of silicone rubber composite insulators using laser-induced breakdown spectroscopy for the remote diagnostics of composite insulators.

LSSE-Closing 16:40

Closing Remarks