

# OPTICS & PHOTONICS International Congress 2020

## TOPICS

### Agri-Photonics

- Smart Agriculture
- Laser Plant Factory
- Laser Sense Organ

### Active Remote Sensing

- Extreme Condition
- Industrial Application

### Infrastructure

- Nondestructive Testing
- Laser-Induced Breakdown Spectroscopy (LIBS)

### Space Technology

- Laser Debris deorbit
- UV imaging

...and more

The aim of “Laser Solutions for Space and the Earth” is to discuss the application of emerging laser technologies to solve various problems for sustainable developments of space and the earth. We consider “Agri-Photonics”, “Space Technology”, “Infrastructure” and “Active Remote Sensing” as the featured topics of the year 2020.

**LSSE 2020 will be held as an online virtual conference.**

Due to the rapid world-wide spreading of the new coronavirus (COVID-2019), we have decided to hold LSSE 2020 as an online virtual conference.



April 21-24, 2020 at virtual conference room

<https://zoom.us/j/8393451683>

LSSE2020 is operated in Japan time.



The speakers and the latest information of the conference will be presented on the web site.

<https://lsse.opicon.jp/>

# Laser Solutions for Space and the Earth 2020

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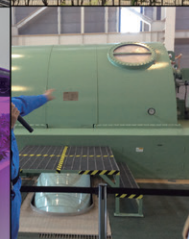
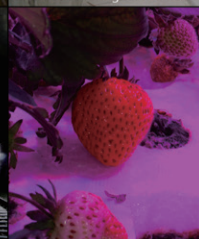
Laser Hammering test  
© ILT and QST



Laser Hammering test vehicle © ILT, QST and Photon-Lab

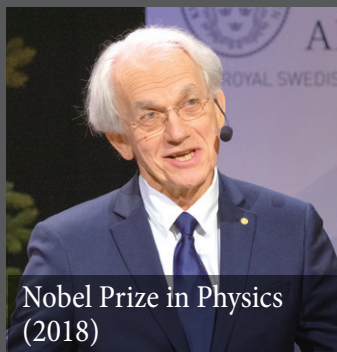


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## INVITED SPEAKERS

### Keynote Speech

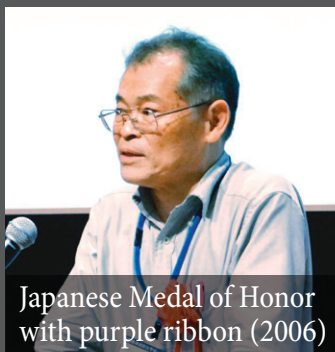


Nobel Prize in Physics  
(2018)

**Prof. Gérard Mourou**

*École polytechnique, France*

Coherent Amplification  
Network



Japanese Medal of Honor  
with purple ribbon (2006)

**Prof. Shigenori Maruyama**

*Tokyo Institute of Technology, Japan*

The origin and evolution of  
life: System evolution of the  
universe and the Earth

Akio Kanai, *Keio University, Japan*

David Megson-Smith, *University of Bristol, UK*

John Ness, *University of Michigan, US*

Yoshihiro Deguchi, *Tokushima University, Japan*

Hiroshi Uechi, *Osaka Gakuin University, Japan*

Mitsuhiro Sato, *HAZAMA ANDO Corporation, Japan*

Hiroyuki Daido, *Institute for Laser Technology (ILT), Japan*

Tokuhiro Nimura, *Japan Spaceguard Association (JSGA), Japan*

Ippei Asahi, *Shikoku Research Institute Inc., Japan*

Marco Casolino, *RIKEN and Istituto Nazionale di Fisica Nucleare (INFN), Italy*

Toshifumi Yanagisawa, *Japan Aerospace eXploration Agency (JAXA), Japan*

Yuji Sano, *Institute for Molecular Science, Japan*

Oleg Gusev, *RIKEN, Japan*

Katsuhiko Tsuno, *RIKEN, Japan*

Tohru Kobayashi, *RIKEN, Japan*

Yukihisa Sanada, *Japan Atomic Energy Agency (JAEA), Japan*

Yuta Terasaka, *Japan Atomic Energy Agency (JAEA), Japan*

...and others.



## REGISTRATION

Registration Fees	
General	35,000 JPY
Student, Retiree	15,000 JPY

## OPTICS & PHOTONICS International Congress 2020 (OPIC2020) <http://opicon.jp/>

Eleven international conferences are held simultaneously. By registering for this conference, you can participate in all international conferences.

- ALPS2020: The 9th Advanced Lasers and Photon Sources
- BISC2020: The 6th Biomedical Imaging and Sensing Conference
- HEDS2020: International Conference on High Energy Density Science 2020
- LDC2020: Laser Display and Lighting Conference 2020
- LEDIA2020: The 8th International Conference on Light-Emitting Devices and Their Industrial Applications
- LSC2020: Conference on Laser and Synchrotron Radiation Combination Experiment 2020
- LSSE2020: Laser Solutions for Space and the Earth 2020
- OMC2020: The 7th Optical Manipulation and Structured Materials Conference
- OPTM2020: Optical Technology and Measurement for Industrial Applications 2020
- OWPT2020: Optical Wireless and Fiber Power Transmission Conference 2020
- XOPT2020: International Conference on X-ray Optics and Applications 2020

## CONFERENCE CHAIR

Toshikazu Ebisuzaki (RIKEN)

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T. Yanagisawa (JAXA, Japan)

Y. Shimada (Institute for Laser Technology, Japan)

A. Nishimura (Japan Atomic Energy Agency, Japan)

S. Shibusawa (Tokyo University of Agriculture and Technology, Japan)

A. Shinjo (Keio University, Japan)

T. Ogawa (RIKEN, Japan)

T. Fukuyama (RIKEN, Japan)

K. Shigemori (Osaka University, Japan)

N. Hasegawa (National Institutes for Quantum and Radiological Science and Technology, Japan)

K. Takayama (Ehime University, Japan)

## POSTER SESSION

15 minutes oral presentation will be given instead of poster presentation

## OFFICIAL LANGUAGE

The official language of LSSE2020 is English.

## LSSE 2020 will be held as an online virtual conference

Due to the rapid world-wide spreading of the new coronavirus (COVID-2019), we have decided to hold LSSE 2020 not as an in-person conference as originally planned, but as an online virtual conference. we use the web conferencing system Zoom with registered speakers and participants who can join.

<https://zoom.us/j/8393451683>

Since we will make every effort to make this conference very useful to all participants, we hope most of you will participate in LSSE 2020 and strengthen our communication in spite of this difficult situation.

Tuesday, April 21

11:00-12:10 LSSE1

Opning & Keynote1

Chair: Akio Kanai  
Institute for Advanced Biosciences  
Keio University

LSSE-OP Opening Remarks

11:00-11:10 Toshikazu Ebisuzaki

RIKEN



LSSE1-01 The origin and evolution of life: System evolution of the universe and the Earth

KEYNOTE

\*Shigenori Maruyama

ELSI, Tokyo Institute of Technology



The habitable planet Earth was born as a dry rocky planet, and atmospheric/oceanic components were secondary accreted through the ABEL bombardment during 4.37-4.20Ga. Including this scenario, there are about 50 conditions to be a habitable planet with civilization.

Lunch (12:10-13:30)

13:30-14:30 LSSE2

Microorganism, Environmental measurement of Fukushima

Chair: Akihiko Nishimura  
Japan Atomic Energy Agency

LSSE2-01 Microbial genome analysis: from basics to frontiers

INVITED

\*Akio Kanai

Keio University



In my talk, I am going to divide my presentation into two parts. The first half will explain the very basics of genome analysis of microorganisms. In the latter half, I would like to mention especially the latest topics in this field that became clear as a result of metagenome analysis.

Coffee Break (14:30-15:30)

15:30-17:00 LSSE3

Microorganism, Radiation measurement

Chair: Akihiko Nishimura  
Japan Atomic Energy Agency  
Akio Kanai  
Institute for Advanced Biosciences  
Keio University

LSSE3-01 Development of Radiation Distribution Sensing Method using One-Dimensional Optical Fiber for Fukushima Daiichi NPS Decommissioning

15:30-15:50

\*Yuta Terasaka<sup>1,2</sup>, Kenichi Watanabe<sup>2</sup>, Akira Uritani<sup>2</sup>, Yuki Sato<sup>1</sup>, Tatsuo Torii<sup>1</sup>, Ikuo Wakaida<sup>1</sup>

1. Japan Atomic Energy Agency 2. Nagoya University

We will introduce the R&D activities about the radiation distribution sensing method using one-dimensional optical fiber for the decommissioning of the Fukushima Daiichi Nuclear Power Station. A novel radiation distribution sensing method which focused on the wavelength information of the emitted spectrum was developed for the high dose rate measurement.

LSSE3-02 15:50-16:10

Introduction to Multi Cubic high energy gamma-ray spectrometer

\*Masaaki Kaburagi<sup>1</sup>, Kenji Shimazoe<sup>2</sup>, Yutaka Otaka<sup>2</sup>, Mizuki Uenomachi<sup>2</sup>, Kei Kamada<sup>3</sup>, Kyoung Jin Kim<sup>3</sup>, Masao Yoshino<sup>3</sup>, Yasuhiro Shoji<sup>3</sup>, Akira Yoshikawa<sup>3</sup>, Hiroyuki Takahashi<sup>2</sup>, Tatsuo Torii<sup>1</sup>

1. Collaborative Laboratories for Advanced Decommissioning Science, Japan Atomic Energy Agency

2. The School of Engineering, The University of Tokyo

3. New Industry Creation Hatchery Center, Tohoku University

We developed a high energy gamma-ray spectrometer using a small cubic CeBr<sub>3</sub> scintillator, and verified that the spectrometer had the energy resolution at 1333 keV are 3.95% at 790 mSv/h.

LSSE3-03 16:10-16:40

INVITED

Cell and bacteria analysis by scanning electron microscopy using neodymium chloride: rapid, informative, insightful

\*Oleg Gusev

Riken

The quality of electron microscopy (EM) visualization of biological objects is constantly improving, primarily with the usage of more complex technologies, such as serial block-face scanning electron microscopy (SEM), focused ion beam scanning electron microscopy, and array tomography. Here we suggest a new rapid method of whole cell sample preparation for scanning EM using neodymium chloride treatment followed by staining with lead acetate.

LSSE3-04 16:40-17:00

Risk Reduction with Prolonged Decommissioning for Fukushima Daiichi Nuclear Power Plant

\*Akihiko Nishimura<sup>1,2</sup>, Akio Kanai<sup>3</sup>, Minoru Yoshida<sup>4</sup>

1. Japan Atomic Energy Agency

2. University of Fukui

3. Keio University

4. HAKUSAN

Effective risk reduction associated with prolonged decommissioning for Fukushima Daiichi NPP (1F) is an urgent issue. Here are eight directions for the fundamental R&D themes.

Wednesday, April 22

09:00-10:30 LSSE4

Environment, conservation and energy

Chair: Akio Kanai  
Institute for Advanced Biosciences  
Keio University

LSSE4-01 09:00-09:30

INVITED

Conversion of Radioactive Waste into Clean and Sustainable Energy

\*Hiroshi Uechi<sup>1</sup>, Akihiko Nishimura<sup>2</sup>

1. Osaka Gakuin University

2. University of Fukui



We propose the concept to convert nuclear radioactive wastes from nuclear plants into clean and sustainable energy through mechanoelectric energy generations (MEG) and energy-harvesting technology.

**LSSE4-02**  
**09:30-10:00**

INVITED

### **Microbial Uranium Immobilization: Could it give a solution for controlling radionuclide dispersal for Fukushima Daichi Nuclear Disaster?**

**\*Yohey Suzuki**

*The University of Tokyo*

Microbes play key roles in transformation of mobile uranium into its immobile forms via reduction, sorption and intracellular uptake. In addition to direct interactions, microbial uranium immobilization is known to occur via incorporation and/or agglomeration into calcium phosphate and calcium carbonate. In this presentation, recent advances will be summarized to seek a solution for controlling radionuclide dispersal for Fukushima Daichi Nuclear Disaster.

**LSSE4-03**  
**10:00-10:30**

INVITED

### **Selective laser ionization for the reduction of radioactive wastes**

**\*Tohru Kobayashi**

*RIKEN Institute of Advanced Photonics*

Based on the transition selection rule, we have developed both efficient and selective photoionization schemes for palladium and zirconium, which will contribute to the reduction of high-level nuclear wastes.



Coffee break (10:30 - 11:00)

**11:00-12:15 LSSEp**

#### **LSSE2020 Poster session(Oral)**

Chair: Noboru Hasegawa  
*QST*  
Takashi Fujii  
*The University of Tokyo*

**LSSEp-01**  
**11:00-11:15**

### **Influence of plastic deformation in laser resonance frequency analysis for metallic anchorage bolt**

**\*Katsuhiro Mikami, Hiroaki Nishikawa**

*Kindai University*

Laser vibration spectra of fastened metallic anchorage bolts with different torque were investigated by laser resonance frequency analysis to reveal influence of the plastic deformation.

**LSSEp-02**  
**11:15-11:30**

### **Electric-field induced second-harmonic generation in atmospheric air using high intensity femtosecond laser pulses**

**\*Takashi Fujii<sup>1</sup>, Masahiro Sato<sup>1</sup>, Shin Nakamura<sup>1</sup>, Akiko Kumada<sup>1</sup>, Megumu Miki<sup>2</sup>, Yuji Oishi<sup>2</sup>**

*1. The University of Tokyo*

*2. Central Research Institute of Electric Power Industry*

The intensity of second harmonics of femtosecond laser pulses increased quadratically versus electric field with laser energy of 3 mJ, suggesting the electric field can be measured with the laser energy above optical breakdown threshold.

**LSSEp-03**  
**11:30-11:45**

### **Thermal Blooming Measurement in Gas with Near-Infrared Laser Beam**

**\*Naoto Sakaki<sup>1</sup>, Tomohiro Tsukihana<sup>1</sup>, Toshikazu Ebisuzaki<sup>1</sup>, Masashi Iwashimizu<sup>2</sup>, Takuya Noritake<sup>2</sup>, Shingo Nishikata<sup>2</sup>, Hiroyuki Daigo<sup>2</sup>, Yoshikatsu Kuroda<sup>2</sup>, Masayuki Fujita<sup>3</sup>, Seiji Taniguchi<sup>3</sup>, Shinji Motokoshi<sup>3</sup>**

*1. RIKEN 2. Mitsubishi Heavy Industries, Co., Ltd.*

*3. Institute for Laser Technology*

It is important to understand thermal blooming effect which distorts the propagation of Laser beam for application like energy transmission. We have started a laboratory experiment to evaluate the effect.

**LSSEp-04**  
**11:45-12:00**

### **Improving the moisture permeability of structural plywood using laser drilling**

**\*Koichi Sakai<sup>1,2</sup>, Kazuhisa Fujita<sup>1</sup>, Kunioki Mima<sup>1</sup>**

*1. The Graduate School for the Creation of New Photonics Industries*

*2. LIHITO, Inc*

Laser drilling in structural plywood improved moisture permeability by 37%, compared with normal screw drilling. It comes from barrel shape of the inner surface of the hole drilled by laser.

**LSSEp-05**  
**12:00-12:15**

### **Promotion of Thermal Energy Plants and Decommissioning NPPs**

**\*Akihiko Nishimura<sup>1</sup>, Toru Okazaki<sup>2</sup>, Hiroshi Uechi<sup>3</sup>**

*1. University of Fukui*

*2. Institute of Applied Energy*

*3. Osaka Gakuin University*

The best way to reduce waste in decommissioning nuclear power plants is reuse for energy security. We propose to modify them as thermal storage plants.

Lunch (12:15-13:30)

**13:30-15:30 LSSE5**

#### **Laser application for new nuclear power**

Chair: Noboru Hasegawa  
*QST*

**LSSE5-01**  
**13:30-14:00**

INVITED



### **Fundamentals of laser peening and applications to life-extension of infrastructure with palm-top-sized handheld lasers**

**\*Yuji Sano<sup>1,2</sup>**

*1. Institute for Molecular Science, National Institutes of Natural Sciences*

*2. Institute of Scientific and Industrial Research, Osaka University*

Laser peening was developed and has been applied to nuclear power reactors since 1999. Ultra-compact high-power pulse lasers developed in ImPACT will extend the application to maintenance of infrastructure.

**LSSE5-02**  
**14:00-14:30**

INVITED

### **Production of fine particles and fragments emitted from laser ceramic and concrete interactions**

**\*Hiroyuki Daido<sup>1</sup>, Tomonori Yamada<sup>2</sup>, Chikara Ito<sup>2</sup>, Masabumi Miyabe<sup>2</sup>, Takuya Shibata<sup>2</sup>, Hiroyuki Furukawa<sup>1</sup>, Shuichi Hasegawa<sup>3</sup>**

*1. Institute for Laser Technology*

*2. Japan Atomic Energy Agency*

*3. The University of Tokyo*

We present fine particle and fragment production from a laser irradiated ceramics and concrete samples during a laser processing as a fundamental study for the debris retrieval for the decommissioning of the Fukushima Dai-ichi Nuclear Power Station.

**LSSE5-03**  
**14:30-15:00**

INVITED



### **Developments in Laser Cutting for Combined Materials of Steel and Concrete**

**\*Mitsuhiko Sato<sup>1</sup>, Eisuke John Minehara<sup>2</sup>**

*1. HAZAMA ANDO Corporation*

*2. LDD Corporation*

We have been developing a laser cutting technique. In full scale mockup experiments, laser cutting has achieved of combined materials in one process. Results indicate that optical fiber core size and efficiency of assist gas largely affect the cutting speed.



LSSE5-04  
15:00 - 15:30

INVITED

## Summary of environmental radiation monitoring around the Fukushima Daiichi Nuclear Power Station

\*Yukihisa Sanada

*Japan Atomic Energy Agency*

Immediately after the Fukushima Dai-ichi Nuclear Power Station accident, many radiation monitoring data have been acquired by various government organizations. In this paper, the current situation of environmental radiation monitoring is summarized.

Thursday, April 23

11:00-12:30 LSSE6

## Space debris 1

Chair: Marco Capitanio  
*University of Florence*

LSSE6-01  
11:00-11:30

INVITED

## Removal of non-functional spacecraft by satellite-mounted laser

\*Tadanori Fukushima<sup>1</sup>, Daisuke Hirata<sup>1</sup>, Jun Yamada<sup>1</sup>, Yuki Itaya<sup>1</sup>, Takayo Ogawa<sup>2</sup>, Katsuhiko Tsuno<sup>2</sup>, Satoshi Wada<sup>2</sup>, Toshikazu Ebisuzaki<sup>2</sup>, Hiroshi Ueno<sup>3</sup>, Takashi Hiramatsu<sup>3</sup>, Akihiro Sasoh<sup>4</sup>, Yusuke Nakamura<sup>4</sup>, Toshiya Hanada<sup>5</sup>, Yuri Matsushita<sup>5</sup>

1. SKY Perfect JSAT Co., Ltd.
2. RIKEN
3. JAXA
4. Nagoya University
5. Kyushu University

SKY Perfect JSAT Co. has launched a new mission, which removes non-functional spacecraft by laser ablation from a satellite-mounted laser with keeping a safe distance, in order to achieve space sustainability in collaboration with RIKEN, JAXA, Nagoya Univ., and Kyushu Univ. Laser ablation takes advantage in control the attitude of tumbling objects. And recent progress of laser technology has increased the feasibility to mount such lasers on small satellite.

LSSE6-02  
11:30-12:00

INVITED

## Impulse Measurement of Laser Induced Ablation in Vacuum

\*Katsuhiko Tsuno<sup>1</sup>, Satoshi Wada<sup>1</sup>, Takayo Ogawa<sup>1</sup>, Tadanori Fukushima<sup>2</sup>, Daisuke Hirata<sup>2</sup>, Jun Yamada<sup>2</sup>, Yuki Itaya<sup>2</sup>

1. RIKEN
2. SKY Perfect JSAT

The new impulse measurement system based on a simple pendulum is developed. The system has temporal resolution of <1sec and sensitivity of  $\sim 10^{-7}$ Ns to measure individual laser induced ablation events. The momentum coupling factor of  $\sim 20 \mu\text{Ns/J}$  is observed over the fluence of  $4\sim 40\text{J/cm}^2$  for aluminum alloy target.

LSSE6-03  
12:00-12:30

INVITED

## National Science Foundation ZEUS\*: A laser-driven mid-scale science facility for studies in the QED regime with R&D history of high peak power laser systems in CUOS

\*John Nees

*Gérard Mourou Center for Ultrafast Optical Science, University of Michigan*

NSF has sponsored the Zetawatt Equivalent Ultrashort pulse laser System (ZEUS), a 3PW multi-beam mid-scale facility to explore relativistic plasmas, nonlinear quantum electrodynamics, and extreme high-field science.

Lunch (12:30-13:30)

13:30-15:00 LSSE7

## Space debris 2

Chair: Toshikazu Ebisuzaki  
*RIKEN*

LSSE7-01  
13:30-14:00

INVITED



## Ground-based optical observation of space debris at Bisei Spaceguard Center.

\*Tokuhiro Nimura, Kota Nishiyama, Tomoko Fujiwara, Shin-ichiro Okumura, Seitaro Urakawa, Nariyasu Hashimoto, Atsuo Asami

*Japan Spaceguard Association (JSGA)*

We introduce about current states and future of observation systems and analysis method for space debris at Bisei Spaceguard Center (BSGC)

LSSE7-02  
14:00-14:30

INVITED



## Monitoring the low earth orbit using optical fence

\*Toshifumi Yanagisawa, Koki Kamiya, Hirohisa Kurosaki

*Japan Aerospace Exploration Agency*

Optical sensors such as CCD and CMOS will be the power tool to monitor the low earth orbit compensating current radar technology. We developed the proto-type using CMOS sensors.

LSSE7-03  
14:30-15:00

INVITED



## Study of Debris identification using Mini-EUSO detector on board the International Space Station

\*Marco Casolino<sup>1</sup>, Toshikazu Ebisuzaki<sup>1</sup>, Lech Wiktor Piotrowski<sup>1</sup>, Naoto Sakaki<sup>1</sup>, Yoshiyuki Takizawa<sup>2</sup>

1. RIKEN, Computational Astrophysics Lab
2. RIKEN, Ultrahigh Precision Optics Technology Team

We will report on observations of Mini-EUSO, a UV telescope observing the Earth from the ISS since 2019 that can detect the transit of debris in space. We are also developing a Mini-EUSO-like larger ground telescope with 1m lenses to test the principle of detection of moving objects and Laser shooting.

Work supported by Innovative Science and Technology Initiative for Security, ATLA Japan.

Coffee Break (15:00-15:30)

15:30-17:00 LSSE8

## Active remote sensing

Chair: Takashi Fujii  
*The University of Tokyo*

LSSE8-01  
15:30-16:00

INVITED

## In-situ Robotic Raman Spectroscopy for Nuclear Decommissioning

\*David Megson-Smith, Tom Scott, John Day, Sam White

*Interface Analysis Center, HH Wills Physics Laboratory, Tyndall Avenue, Bristol, BS8 1TL, United Kingdom*

Aside from the radioactive characteristics of nuclear waste it is imperative that chemical composition is also assessed. To this end, a range of fibre coupled Raman sensors for remote inspection of extreme environments are presented, including; endoscopic-contact, short working distance and stand-off sensors. Examples of their operation whilst deployed on various robotic platforms are given.

LSSE8-02  
16:00-16:30

INVITED

## Industrial applications of LIBS technology

\*Yoshihiro Deguchi<sup>1,2</sup>, Zhenzhen Wang<sup>2,1</sup>, Minchao Cui<sup>3,1</sup>

1. Tokushima University
2. Xi'an Jiaotong University
3. Northwestern Polytechnical University

Long and Short Double-Pulse LIBS was applied to molten steel samples to demonstrate the quantitative detection ability for the advanced monitoring and control methods in iron and steel making processes.

LSSE8-03  
16:30-17:00

INVITED

### Measurement of resonance Raman excitation profile for realization of hazardous substance remote sensing technology

\*Ippei Asahi, Sachiyo Sugimoto, Yuji Ichikawa, Masakazu Ogita, Ayako Hoshino

*Shikoku Research Institute Inc.*

We conduct a research on trace substance detection based on the resonance Raman effect in order to realize a technology for safely measuring hazardous substances remotely. In this presentation, we measure the resonance Raman excitation profile of SO<sub>2</sub> and NO, which are air pollutants, and evaluate the feasibility of remote measurement.

Short break (17:00-17:10)

17:10-18:10 LSSE9

### Keynote2

Chair: Toshikazu Ebisuzaki  
*RIKEN*

LSSE9-01  
17:10-18:10

KEYNOTE



### Coherent Amplification Network

\*Gerard Mourou

*Ecole Polytechnique*

Friday, April 24

11:00-12:30 LSSE10

### Agri-photonics 1

Chair: Satoshi Wada  
*RIKEN*

LSSE10-01  
11:00-11:30

INVITED

### The effect of laser irradiated on the stem of the Mikania Micrantha

\*Yuan Chung Hsu, Yu Pin Lan

*National Chiao Tung University*

Here we observed mortality of the different laser energy and laser beam area irradiated on the stem of the Mikania micrantha.

LSSE10-02  
11:30-12:00

INVITED

### Plant chemical biology research going toward the future agriculture

\*Takeshi Nakano

*Kyoto Univ.*

Chemical biology is a new research field that are trying to elucidate unknown mysteries in biology by chemicals as research tools. If we are able to find novel compounds that positively regulate plant growth, it will be useful tool, which can clarify unknown molecular mechanism of plant growth, and it will be used for applied plant science as agriculture. We are trying to identify novel plant growth genes and chemicals, and to apply them for agriculture of rice and sugarcane.

LSSE10-03  
12:00-12:30

INVITED

### Prediction of optimal conditions for maximising yields of metabolites with a dynamic pathway simulator

\*Yu Atsumi

*SyntheticGestalt*

We have developed a dynamic simulator of plant cell metabolic pathways based on enzymatic reactions and reaction rates. This simulator enables us to predict the relationship between a genetic intervention and the monosaccharide production ratio, which is useful for yield maximization.

Lunch (12:30-13:30)

13:30-15:00 LSSE11

### Agri-Photonics 2

Chair: Norihito Saito  
*RIKEN*

LSSE11-01  
13:30-14:00

INVITED



### Weather Predictability and Data Assimilation: Perspectives Toward Prediction and Control in Agriculture

\*Takemasa Miyoshi

*RIKEN*

Numerical weather prediction (NWP) is probably the most successful prediction made by modern science. Here, predictability and data assimilation are the key. The knowledge obtained in NWP may be useful in different areas including agriculture.

LSSE11-02  
14:00-14:30

INVITED



### Application of agri-photonics for regulation of plant-light interactions in crops

\*Hironori Itoh

*National Agriculture and Food Research Organization*

Crops use light information to adapt to environmental fluctuations, but their responses are sometimes undesirable and uncontrollable. I will introduce the utility of LEDs for genetic improvement of cereal crops.

LSSE11-03  
14:30-15:00

INVITED

### Effects of growth humidity and light quality on keeping freshness in lettuce

\*Yohtaro Saito<sup>1</sup>, Y. Hara<sup>1</sup>, M. Nagata<sup>2</sup>, M. Asai<sup>2</sup>, N. Nakamura<sup>2</sup>, K. Kato<sup>3</sup>, K. C. Yamada<sup>3</sup>, T. Iwaki<sup>3</sup>, and S. Wada<sup>1</sup>

1. *RIKEN Center for Advanced Photonics*

2. *Food Research Institute, National Agriculture and Food Research Organization*

3. *Agri Open Innovation Institute*

The purpose of this study was to clarify the effects of cultivation environment, especially relative humidity and light quality, on the maintenance of freshness after harvest in lettuce.

15:00-15:15 Closing

15:00-15:15 Closing Remarks

LSSE web-meeting room  
<https://zoom.us/j/8393451683>