

# ADVANCE PROGRAM



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WITH

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The Magnetics  
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Electronics,  
Information and  
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Image Electronics  
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Image Information  
and Television  
Engineers

The Japan Society  
for Precision  
Engineering

The Laser Society of  
Japan

## International Symposium on Imaging, Sensing, and Optical Memory 2018

*Kitakyushu International Conference  
Center, Kitakyushu, Japan*

Oct. 21 - Oct. 24, 2018

### SPONSORED BY

-The Optical Society of Japan  
(OSJ)

### COSPONSORED BY

-The Japan Society of Applied  
Physics (JSAP)  
-Optoelectronics Industry and  
Technology Development  
Association (OITDA)

### FINANCIALLY SUPPORTED BY

-The Takano Eiichi Optical Science  
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Telecommunications Technology  
Research, Foundation  
-Nippon Sheet Glass Foundation  
for Materials Science and  
Engineering  
-Kitakyushu City



TAKANO FUNDS



### Deadlines

Post Deadline Papers:

Sep. 3, 2018

Advance Registration:

Oct. 8, 2018

<http://www.isom.jp/>

## Symposium Schedule

	<b>Sunday Oct. 21</b>	<b>Monday Oct. 22</b>	
9:00	Registration 15:00-17:20	Registration 8:30-13:00	9:00
10:00		<b>Mo-A</b> Opening & Keynote	10:00
11:00		<b>Mo-B</b> Nanophotonics and Plasmonics 1	11:00
12:00		Break	12:00
13:00		<b>Mo-C</b> Holographic Memory 1	13:00
14:00		Lunch	14:00
15:00		<b>Mo-D</b> Special Invited	15:00
16:00		<b>Mo-E</b> Multimodal Imaging and Sensing (Special Session)	16:00
17:00		Break	17:00
18:00	Get Together	<b>Mo-F</b> Digital Holography 1	18:00
19:00			19:00
20:00			20:00
21:00			21:00

	<b>Tuesday Oct. 23</b>	<b>Wednesday Oct. 24</b>	
9:00	Registration 8:30-13:00	Registration 8:30-12:00	9:00
10:00	<b>Tu-G</b> Nanophotonics and Plasmonics 2	<b>We-K</b> Digital Holography 2	10:00
	Break	Break	
11:00	<b>Tu-H</b> Holographic Memory 2	<b>We-L</b> Computational Imaging (Special Session)	11:00
12:00	ISOM'19 Announcement & Photo		12:00
13:00	Lunch	Lunch	13:00
14:00	<b>Tu-I</b> Emerging Technologies	<b>We-M</b> Automotive	14:00
15:00	Break	<b>We-N</b> Applications of Holographic Optical Elements (Special Session)	15:00
16:00	<b>Tu-J</b> Poster Session Odd 15:30-16:30 Even 16:30-17:30	<b>We-PD</b> Post Deadline	16:00
17:00	Break	Award & Closing	17:00
18:00	Break		18:00
19:00	Banquet		19:00
20:00			20:00
21:00			21:00

## WELCOME TO ISOM'18

### WELCOME STATEMENT FROM THE ORGANIZING COMMITTEE CHAIRPERSON



The 28<sup>th</sup> ISOM (ISOM'18) will be held in Kitakyushu, Fukuoka, Japan from Oct. 21 to 24, 2018.

On behalf of the ISOM organizing committee, I am delighted to welcome all of you to the ISOM'18 in Japan.

The last ISOM meeting held in Matsue, Japan was very successful to share new developments of holographic memories, digital holography, computational imaging, bio-sensing, display, nanophotonics and plasmonics, etc.

Last year, ISOM extended the conference scope to broader optical fields and applications, and changed the conference name as "International Symposium on Imaging, Sensing, and Optical Memory." The new ISOM includes the fields of image sensing, medical and bio-optics, nano photonics, information system, holographic technologies, as well as optical memory. We believe that the change of ISOM produces technological innovations in imaging and sensing technologies, and many applications of optical memory technologies in the fields of medical and bio-technologies, image sensing, nanotechnologies, etc.

We are very proud of the ISOM activities, because many of technologies leading new developments and new applications have been first presented and discussed in ISOM meeting. Since the first ISOM meeting in 1987, ISOM has led innovation of optical memory and economic growth in optical industry.

I sincerely ask all of ISOM'18 participants to discuss on new technologies of the next generation optical memory and new applications of optical memory technologies in coming ISOM'18.

A large, stylized handwritten signature in black ink, consisting of several loops and flourishes, representing the name Yoshimasa Kawata.

Yoshimasa Kawata  
ISOM'18 Organizing Committee, Chairperson

## INTRODUCTION

The 28th ISOM (ISOM'18) will be held from October 21 to October 24, 2018 at Kitakyushu International Conference Center, Kitakyushu, Japan.

The origin of ISOM is SOM (Symposium on Optical Memory), which was held firstly in 1985 in Tokyo as a Japanese domestic symposium. The first ISOM (International Symposium on Optical Memory) was held in 1987 also in Tokyo. Until 1994, ISOM and SOM were held alternately every other year, and since 1995, ISOM has been held every year. The total number of papers of the past symposiums has reached 3,363, and the total number of participants has reached 10,300.

The purpose of the symposium was to provide a forum for information exchange on a broad range of topics covering science and technology in optical memory and its related fields. However, information explosion in the internet and cloud service has been enforcing optical memory to change from that for consumer storage to that for enterprise storage. Many colleagues of us have been seeking for new frontiers of optical memory technologies. Considering this situation, the scopes of ISOM are being continuously updated and have been reorganized in 2016. To further highlight them, the official name of ISOM was changed from “International Symposium on Optical Memory” to “International Symposium on Imaging, Sensing, and Optical Memory” in 2017. Presentations related to the new scopes as well as the conventional ones would be strongly encouraged.

In ISOM'18, along this direction, it will be very much expected to discuss the current status of optical memory, imaging, sensing, and other related technologies. In addition, we are planning to have a demonstration session at the symposium as in the last three years, in which authors will be able to show their vivid and attractive research results.

We are looking forward to your participation and seeing you in Kitakyushu, Japan.

# SCOPE OF THE SYMPOSIUM

ISOM'18 will discuss the current status of Optical Memory, Imaging, Sensing, and Other Related Technologies.

The scope of ISOM was drastically changed in 2017. ISOM will provide the attractive fields to exchange the latest advances or ideas in the above research fields and also provide scientific interaction and collaboration.

Topics to be covered in this symposium include, but are not restricted to:

## 1. Optical Memory

- Professional Archive System
- Holographic Memory
- High-density Recording
- Media and Material Science
- Drive Technologies and Signal Processing
- Components and Devices
- Testing Methods
- Others

## 2. Imaging

- Computational Imaging
- Wavefront Coding
- Image Processing
- Optical System Design
- Devices
- Others

## 3. Sensing

- Medical and Bio-systems
- Three-dimensional Sensing
- Digital Holography
- Spectroscopy
- Bio-lab on a Disc
- Others

## 4. Other Related Technologies

- Optical Interconnection and Switching
- Optical Information Processing
- Nanophotonics and Plasmonics
- Components
- Material
- Display
- Photolithography
- Nonvolatile Memory
- Emerging Technologies and New World
- Others

# REGISTRATION

All participants (including speakers) are requested to register, and are encouraged to register in advance (by **October 8, 2018**) in order to receive the early registration discount.

## I. Advance Registration

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The Symposium registration information and forms can be obtained from ISOM'18 website (<http://www.isom.jp>). If you have any questions, please contact ISOM'18 secretariat office.

## II. Onsite Registration

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The registration desk will be located at the 1st floor of Kitakyushu International Conference Center from Sunday through Wednesday during the following hours.

Oct. 21: 15:00 - 17:20

Oct. 22: 08:30 - 13:00

Oct. 23: 08:30 - 13:00

Oct. 24: 08:30 - 12:00

Type	Before / On October 8, 2018	Onsite
Regular	JPY 50,000	JPY 60,000
Student & Retiree	JPY 10,000	JPY 15,000
Banquet	JPY 5,000	JPY 7,000

The registration fee for the symposium includes admission to all the technical sessions and an online Technical Digest. Students are asked for showing their ID cards.

## III. Registration and Payment

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Those who wish to attend ISOM'18 will be able to register on the web (<http://www.isom.jp/>) after about August, 2018. The deadline for advance registration is **October 8, 2018**. After that, the registration will be processed at the symposium site upon arrival.

Payment should be made in Japanese Yen by bank transfer (inside Japan only) or by credit cards (VISA and Master Card) payable to ISOM'18. No personal checks will be accepted.

## IV. Registration Cancellation Policy

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As a rule, no refunds of the registration fee will be made for any reasons whatever. Even in the event of registrant unable to attend the symposium, they will be able to download the online Technical Digest.

# INSTRUCTION FOR SPEAKERS

## ORAL PRESENTATION

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- ▶ Time assigned for

Type	Total	Presentation	Discussion
Keynote	30 min.	30 min.	---
Invited	25 min.	20 min.	5 min.
Contributed	20 min.	15 min.	5 min.

- ▶ All speakers are requested to get in touch with their presiders 15 minutes before their sessions start.
- ▶ The conference room will contain a projector, a laptop, a podium microphone, a screen and a laser pointer.
- ▶ If speakers use their own laptop, they will be requested to confirm its connection with the projector in the conference room during break time or in the morning. We recommend all speakers to have this check the day before their presentations.
- ▶ If speakers don't use their own laptop, they are requested to upload their presentation materials in a USB memory at the podium at least one hour prior to their presentations. We recommend the speakers to use PDF files in order to prevent file format or version troubles.
- ▶ We recommend all speakers to use more than 16-point font. The audience expects well-prepared presentations with clearly visible figures and captions, as well as good conclusion.

## POSTER PRESENTATION

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- ▶ Your session code will be indicated on the panel board. You will be provided with the material to mount your poster onto the board.
- ▶ Each author is provided with a 180 cm high x 90 cm wide poster space on which a summary of the paper is to be displayed.
- ▶ All authors are requested to affix their posters before 15:30 on the day of the poster session. Posters are to be removed after the Banquet.
- ▶ Authors must remain in the vicinity of the poster board at least for the duration of the assigned time (1 hour). The first half (15:30-16:30) is for authors with odd-number papers (Tu-J-01, 03, ---) and the second half (16:30-17:30) is for authors with even-number papers (Tu-J-02, 04, ---). The absence of authors during the assigned time is treated as "CANCELLED". The session presiders will check all authors during the assigned time.

Any papers which are not presented during the Oral or Poster session will be regarded as "CANCELLED".



## POST-DEADLINE PAPERS

A limited number of papers will be accepted for presentation of significant results obtained after the deadline. A delegated author has to fill in the paper submission form including a 35-word abstract following the instruction for submission at the ISOM website (<http://www.isom.jp/>), and then a 2-page PDF summary should be submitted through the website.

The ISOM web submission system does not accept any PDF file including 2-byte characters (for example, Japanese, Chinese and Korean characters). The local fonts should be removed from the text body and figures before submission.

Submission deadline is Sep. 3, 2018. The best two post-deadline papers are allowed as oral presentations in the final session. Other post-deadline papers (but limited numbers) will be presented in the poster session. Authors will be notified by the middle of September, 2018 whether their papers are accepted.

- Time assigned for:

Type	Total	Presentation	Discussion
Post deadline	15 min.	12 min.	3 min.

## FINANCIAL SUPPORT

Thanks to the Takano Eiichi Optical Science Funds, limited financial support for student presenters in ISOM'18 will be provided.

Applicants must be full-time students living overseas.

Student presenters who are interested in getting this support should submit an application form (announced later) after receiving the acceptance notice of their submitted paper.

## **DEMO PRESENTATION IN POSTER SESSION**

Poster presentations with demonstration will be given in the poster session. This is a new approach of poster session in addition to usual poster presentation.

The technical demonstration will be exhibited repeatedly during the session in front of poster boards. Participants can take a close look at the new technologies!

## **PUBLICATION OF SYMPOSIUM PAPERS**

Online Technical Digest includes invited papers, accepted contributed papers, and limited numbers of post deadline papers. It will be available on October 15-24, 2018. If you complete the payment, you will be informed of the website of the online Technical Digest on October 15, 2018 and able to download it in advance. Otherwise, you will be able to download it onsite.

The conference papers will be published in September 2019 as a special issue of the Japanese Journal of Applied Physics (JJAP), which is the English-language journal of the Japan Society of Applied Physics (JSAP). The authors who will have, by themselves, presented papers at ISOM'18 will be allowed to submit their papers for publication in this special issue. The authors of invited and contributed (including post-deadline) papers are encouraged to submit Progress Reviews and Regular Papers, respectively.

The instructions for preparation of manuscript and the agreement form for the special issue will be sent via e-mail after the conference. The deadline for submission of manuscripts is January 27, 2019. Submitted papers will be reviewed based on the JJAP standard.

# SPECIAL PROGRAMS

## SOCIAL PROGRAM

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### **Get Together Reception**

- Date & Time: Sunday, October 21, 17:00-19:00
- Place: Kitakyushu International Conference Center 1F, Room 11
- Fee: No charge

All attendees including spouses are invited to the Get Together Reception.

### **Banquet Reception**

- Date & Time: Tuesday, October 23, 18:00-20:00
- Place: Kitakyushu International Conference Center 1F, Event Hall
- Fee: Advance registration 5,000 JPY  
Onsite registration 7,000 JPY

Ticket for the Banquet Reception is not included in the registration fee. Application for Banquet can be made online or onsite.

## ISOM'18 Secretariat

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Mitsuhiro Kimura (Secretary)

- Tel: +81-3-5925-2840 / Fax: +81-3-5925-2913
- E-mail: [secretary@isom.jp](mailto:secretary@isom.jp)
- Add: c/o Adthree Publishing Co., Ltd.  
27-37, Higashinakano 4-chome,  
Nakano-ku, Tokyo 164-0003, Japan

# GENERAL INFORMATION

## I. Official Language

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The official language of ISOM'18 is English.

## II. Message Board

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Official Information Board and Message Board will be set near the Registration Desk. Message will be taken during registration hours on Monday through Wednesday and posted on the Message Board. Please check the bulletin board daily to receive your messages. Messages for participants at the meeting should be directed to ISOM'18 Symposium Registration Desk.

## III. Lunches

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A lunch map in the vicinity of Kitakyushu International Conference Center will be provided at the Registration Desk.

## IV. Others

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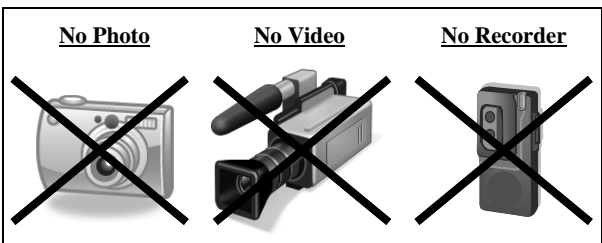
To receive further ISOM'18 announcement, please visit ISOM website (<http://www.isom.jp/>).

### Information of Kitakyushu City

Kitakyushu City has a lot of fascinating sightseeing places such as Kokura Castle, Kanmon Straits, Mt. Sarakura, and so on. We are going to supply the brochures of Kitakyushu sightseeing information at the Registration Desk. Please feel free to use them.

# ATTENTION

It is not allowed to take photos and videos of any presentation materials in ISOM'18.



# TECHNICAL PROGRAM

**October 22, 2018 (Monday)**

## **Mo-A: Opening & Keynote**

**Presider:** Osamu Matoba (Kobe University, Japan)

**Mo-A-01**

**09:00 Opening Remarks**

Yoshimasa Kawata (Shizuoka University, Japan)

Organizing Committee Chairperson

**Mo-A-02 Keynote**

**09:15 Meta-devices: Advance and Application**

Din Ping Tsai

Academia Sinica, National Taiwan University  
(Taiwan)

Meta-devices using various metasurfaces to attain novel optical functionalities for photonic applications in demand will be reported and discussed, including versatile polarization control, pixel-scale metalens, and achromatic meta-lens for imaging and sensing.

## **Mo-B: Nanophotonics and Plasmonics 1**

**Presiders:** Minoru Takeda (Kyoto Institute of Technology, Japan)

Masud Mansuripur (University of Arizona, USA)

**Mo-B-01 Invited**

**09:45 Complex Wavefront Shaping with Disorder-Engineered Metasurfaces**

Atsushi Shibukawa<sup>1,3</sup>, Mooseok Jang<sup>2,3</sup>, Yu Horie<sup>3</sup>, Andrei Faraon<sup>3</sup>, Changhuei Yang<sup>3</sup>

<sup>1</sup>Okayama University (Japan), <sup>2</sup>Korea University (Korea), <sup>3</sup>California Institute of Technology (USA)

We describe complex wavefront shaping with disorder-engineered metasurface, which allows optical manipulation capabilities beyond those of conventional optics. We demonstrate such ability with high resolution (NA=0.5), wide FOV (~8mm) fluorescence images by disordered-metasurface-assisted wavefront shaping.

**Mo-B-02 Invited**

**10:10 Emission Enhancement of Self-Coupled Quantum Dots and Its Applications**

Naoya Tate<sup>1</sup>, Yuki Miyata<sup>1</sup>, Tadashi Kawazoe<sup>2</sup>

<sup>1</sup>Kyushu University, <sup>2</sup>Tokyo Denki University (Japan)

We have demonstrated a novel technique for autonomously coupling heterogeneous quantum dots to induce particular optical interactions and corresponding emission enhancement. As one of the practical applications of the technique, photovoltaic application has been discussed.

**Mo-B-03**

**10:35 Broadband Achromatic Metalens for Full-Color Imaging**

Cheng Hung Chu<sup>1</sup>, Shuming Wang<sup>2</sup>, Pin Chieh Wu<sup>1</sup>, Vin-Cent Su<sup>3</sup>, Ming Lun Tseng<sup>1</sup>, Ren Jie Lin<sup>4</sup>, Yi-Chieh Lai<sup>4</sup>, Mu-Ku Chen<sup>4</sup>, Hsin Yu Kuo<sup>4</sup>, Bo Han Chen<sup>4</sup>, Yu Han Chen<sup>4</sup>, Tao Li<sup>2</sup>, Zhenlin Wang<sup>2</sup>, Shining Zhu<sup>2</sup>, Din Ping Tsai<sup>1,4</sup>

<sup>1</sup>Academia Sinica (Taiwan), <sup>2</sup>Nanjing University (China), <sup>3</sup>National United University, <sup>4</sup>National Taiwan University (Taiwan)

We propose broadband achromatic GaN-based metalenses working in the visible region. We demonstrate the full-color imaging performance in transmission mode. Our metalenses have significant advantages of low-cost and semiconductor foundry compatibility.

**10:55 - 11:15 Break**

**Mo-C: Holographic Memory 1**

**Presiders:** Evgenii Zlokazov (National Research Nuclear University, Bauman Moscow State Technical University, Russia)  
Nobuhiro Kinoshita (NHK, Japan)

**Mo-C-01 Invited**

**11:15 Detection Method of Complex Amplitude of Signal Beam for Intensity- and Phase-Modulated Holographic Memory**

Masatoshi Bunsen, Shosei Tateyama, Soichiro Sumida

Fukuoka University (Japan)

Detection of a signal beam whose intensity and phase are spatially modulated in multiple values is investigated numerically and experimentally to increase storage capacity of holographic data storage. Single-shot and non-interferometric methods are discussed.

## **Mo-C-02**

### **11:40 Design and Properties of HSL Multi-Layered Media for Magnetic Hologram Memory**

Yuichi Nakamura<sup>1</sup>, Naoki Hoshiba<sup>1</sup>, Taichi Goto<sup>1,2</sup>, Pang Boey Lim<sup>1</sup>, Hironaga Uchida<sup>1</sup>, Mitsuteru Inoue<sup>1</sup>

<sup>1</sup>Toyohashi University of Technology, <sup>2</sup>JST PRESTO (Japan)

Insertion of heat sink layer (HSL) is effective to record a clear and deep magnetic hologram. We present a design of HSL media and the performances of the fabricated media such as diffraction efficiency.

## **Mo-C-03**

### **12:00 Superimposed Spatial Guard Interval on Data Page for Reducing Inter-Symbol Interference in Amplitude Multi-Level Recording Holographic Memory**

Tetsuhiko Muroi, Yutaro Katano, Nobuhiro Kinoshita, Norihiko Ishii

Japan Broadcasting Corporation (NHK) (Japan)

We proposed a data page with a spatial guard interval that consists of a black area between symbols. The inter-symbol interference could be reduced and the bERs were enough low in 4-level amplitude data pages.

**12:20 - 13:50 Lunch**

## **Mo-D: Special Invited**

**President:** Osamu Matoba (Kobe University, Japan)

### **Mo-D-01 Special Invited**

#### **13:50 Biochip Technologies for New Horizons; Small, Massive, and High Sensitive**

Yuzuru Takamura

Japan Advanced Institute of Science and Technology (Japan)

As examples of further development of biochip technologies, three approaches will be presented for small, massive, and high sensitive with the topics of carbon nanotube sensors using aptamer, spatial transcriptome by PZT actuator array, and mass spectrometry on-chip.

## **Mo-E: Multimodal Imaging and Sensing (Special Session)**

**Presiders:** Kimihiro Saito (Kindai University Technical College, Japan)  
Masayuki Ono (JVC Kenwood, Japan)

### **Mo-E-01 Invited**

#### **14:20 Tissue Diagnosis Using Nanoscale Morphological Information Revealed by Quantitative Phase Imaging**

Masanori Takabayashi<sup>1</sup>, Hassaan Majeed<sup>2</sup>, Andre Kajdacsy-Balla<sup>3</sup>, Gabriel Popescu<sup>2</sup>

<sup>1</sup>Kyushu Institute of Technology (Japan),

<sup>2</sup>University of Illinois at Urbana-Champaign,

<sup>3</sup>University of Illinois at Chicago (USA)

We introduce how to extract the intrinsic markers of nanoscale morphological information in tissue biopsies from their quantitative phase images, and demonstrate cancer screenings using highly-sensitive quantitative phase imaging technique: spatial light interference microscopy (SLIM).

### **Mo-E-02 Invited**

#### **14:45 Increase of Penetration Depth in Optical Coherence Tomography by Wavefront Shaping**

Hyun Choi<sup>1</sup>, Jaeduck Jang<sup>2</sup>, Jong Uk Kim<sup>3</sup>

<sup>1</sup>Konyang University, <sup>2</sup>Samsung Advanced Institute of Technology, <sup>3</sup>Korea Advanced Institute of Science and Technology (Korea)

Optical coherence tomography (OCT) has limited application due to the limited depth of penetration in the highly turbid media. We propose a wavefront shape OCT that can increase the penetration depth of OCT.

### **Mo-E-03 Invited**

#### **15:10 Micro-Scale Infrared Thermography and Its Application to Thermo-Spectroscopy**

Meguya Ryu, Junko Morikawa



Tokyo Institute of Technology (Japan)

The recent instrumentation of micro-scale IR thermography and its application to thermospectroscopy are presented with regard to the exothermic heat of phase transition of heat storage materials and the chemical reaction in micro-fluidics.

**Mo-E-04 Invited**

**15:35 Spectral Emissivity Measurement Based on the Comparison with a Blackbody**

Masatoshi Imbe

National Institute of Advanced Industrial Science and Technology (Japan)

Emissivity is essential for non-contact temperature measurement with a radiation thermometer and a thermographic camera. The emissivity measurement system based on the comparison of thermal radiations emitted by a sample and a reference blackbody radiator is presented.

**Mo-E-05 Invited**

**16:00 Optical Frequency Comb Based Ultrafast Waveform Synthesis and Analysis**

Tatsutoshi Shioda

Saitama University (Japan)

An optical arbitrary waveform can be synthesized by manipulating the optical frequency comb electric-field vector. Conversely, to measure the electric field is equivalent to see the waveform in the picosecond and femtosecond time scale.

**16:25 - 16:45 Break**

**Mo-F: Digital Holography 1**

**Presiders:** Ryuichi Katayama (Fukuoka Institute of Technology, Japan)  
Yusuke Nakamura (Hitachi, Ltd., Japan)

**Mo-F-01 Invited**

**16:45 Resolution Enhancement in Digital Holographic Microscopy**

Xin-Ji Lai<sup>1</sup>, Han-Yen Tu<sup>2</sup>, Yu-Chih Lin<sup>1</sup>, Chau-Jern Cheng<sup>1</sup>

<sup>1</sup>National Taiwan Normal University, <sup>2</sup>Chinese Culture University (Taiwan)

This talk describes resolution enhancement techniques in digital holographic microscopy for super-resolved imaging. The resolution enhancement is applied to beam/sample rotation approaches for two-/three-dimensional (2D/3D) holographic imaging to increase the space-bandwidth product in hologram acquisition.

**Mo-F-02 Invited**

**17:10 Wide Field-of-View Single-Shot Lensless Digital Holography Based on Grating Modulation**

Liangcai Cao, Wenhui Zhang, Hua Zhang, Zehao He, Rujia Li, Guofan Jin

Tsinghua University (China)

The field of view (FOV) of lensless digital holography (DH) is limited by the photosensitive area of the sensor. A grating-based method is proposed associated with spatial spectral multiplexing to realize wide FOV imaging in lensless DH.

**Mo-F-03**

**17:35 Demonstration of Digital Holographic Microscope Based on Planar Lightwave Circuit (PLC-DHM) System**

Katsutoshi Inomoto<sup>1</sup>, Hiroki Satake<sup>1</sup>, Kanami Ikeda<sup>2</sup>, Syutarou Kodama<sup>1</sup>, Katsunari Okamoto<sup>3</sup>, Eriko Watanabe<sup>1</sup>

<sup>1</sup>The University of Electro-Communications, <sup>2</sup>Osaka Prefecture University, <sup>3</sup>Okamoto Laboratory (Japan)

We develop a digital holographic microscope based on planar lightwave circuit (PLC-DHM) and experimentally demonstrate quantitative phase and three-dimensional imaging by improving the optical system design, phase shift method, and data reconstruction method.

**Mo-F-04**

**17:55 Multispectral Three-Dimensional Imaging for the White-Light Source by Measurement of Differential Wavefront Curvature**

Kittiphot Jianwattananukul, Kyu Yoshimori

Iwate University (Japan)

Multispectral three-dimensional imaging for spatially incoherent, polychromatic objects based on measurement of differential wavefront curvature has been proposed. This paper presents an experimental demonstration of reconstructed image at each spectral peak. The measurement time of this method is much smaller than that of our previous methods.

## **October 23, 2018 (Tuesday)**

### **Tu-G: Nanophotonics and Plasmonics 2**

**Presiders:** Tsung Sheng Kao (National Chiao Tung University, Taiwan)  
Takanori Nomura (Wakayama University, Japan)

#### **Tu-G-01 Invited**

##### **09:00 Aluminum Integrated Resonant Unit of Metasurfaces for Broadband Achromatic and High Efficient Meta-Devices**

Hui-Hsin Hsiao<sup>1</sup>, Yu Han Chen<sup>2</sup>, Ren Jie Lin<sup>2</sup>,  
Din Ping Tsai<sup>2,3</sup>

<sup>1</sup>National Taiwan Normal University, <sup>2</sup>National Taiwan University, <sup>3</sup>Academia Sinica (Taiwan)

Via the incorporation of integrated-resonant units (IRUs) into metasurfaces, we demonstrate IRUs have great capacity for achieving controllable smooth and linear phase dispersion as well as enhancing the working efficiency over a continuously broad bandwidth.

#### **Tu-G-02 Invited**

##### **09:25 High Speed Laser Micro/Nanolithography through Polar Coordinate System**

Zhen Bai<sup>1,2</sup>, Jingsong Wei<sup>1</sup>

<sup>1</sup>Chinese Academy of Sciences, <sup>2</sup>University of Chinese Academy of Sciences (China)

A high speed laser lithography system in polar coordinate system is established to fabricate arbitrary pattern structures. The writing speed can reach up to 600 mm<sup>2</sup>/min at 1.0 μm linewidth (or 10 m/s), the maximum sample size can be 120 mm in diameter, and the minimum feature linewidth is about 100 nm.

#### **Tu-G-03**

##### **09:50 Enhancement of Photoelectron Emission with SPR of Periodic Metal Nano Structure**

Hirofumi Morisawa, Atsushi Ono, Wataru Inami,  
Yoshimasa Kawata

Shizuoka University (Japan)

We enhanced photoelectron emission by SPR using periodic metal nano structure composed of

aluminum hole array and disk array. This achievement can develop surface emission type electron sources and improve detection efficiency of photomultiplier tubes.

**10:10 - 10:30 Break**

## **Tu-H: Holographic Memory 2**

**Presiders:** Nobuhiro Kinoshita (NHK, Japan)  
Masanori Takabayashi (Kyushu Institute of Technology, Japan)

### **Tu-H-01**

#### **10:30 Development of Phase Multi-Level Holographic Data Storage System**

Takeru Utsugi, Mayumi Sasaki, Kazuhiko Ono, Yukinobu Tada

Hitachi-LG Data Storage (Japan)

We are developing a phase multi-level recording system that records signal light with QPSK (Quadrature Phase Shift Keying) in holograms, based on conventional angular-multiplexing intensity binary HDS system.

### **Tu-H-02**

#### **10:50 Nyquist Frequency Recorded Non-Interferometric Phase Retrieval for Holographic Data Storage**

Xiao Lin, Xiaodi Tan

Fujian Normal University (China)

Nyquist frequency recorded non-interferometric phase retrieval method for holographic data storage is proposed. Our method can shorten recording area by 4 times and reduce material consumption by 35% to increase storage capacity by 1.5 times.

### **Tu-H-03**

#### **11:10 Holographic Data Storage Based on a Binary Computer-Generated Hologram**

Naru Yoneda, Yusuke Saita, Takanori Nomura

Wakayama University (Japan)

To improve a data-transfer rate depending on a refresh rate of a spatial light modulator, a binary hologram is introduced to computer-generated-hologram-based holographic data storage. Experimental results confirm the feasibility of

the method.

## **Tu-H-04**

### **11:30 Improvement in Linear Recording Density for Holographic Optical Correlator by Low-Correlation Data Interleaving**

Keisuke Saito<sup>1</sup>, Taku Hoshizawa<sup>1</sup>, Kanami Ikeda<sup>2</sup>, Toshihiro Sugaya<sup>1</sup>, Eriko Watanabe<sup>1</sup>

<sup>1</sup>The University of Electro-Communications,  
<sup>2</sup>Osaka Prefecture University (Japan)

We propose a new methodology to improve capacity and throughput of the optical correlator. This methodology rearranging the order of data considering the correlation with adjacent to suppress cross talk realizes the improvement by 28%.

## **Tu-H-05**

### **11:50 Computer Generated Fourier Holograms: Benefits and Limitations of Application for Sensing, Imaging and Data Storage**

Evgenii Zlokazov<sup>1,2</sup>

<sup>1</sup>National Research Nuclear University, <sup>2</sup>Bauman Moscow State Technical University (Russia)

Application of computer holography methods provides the possibility to obtain the high quality holograms of objects that exist as digital models without the necessity of complex and high precision optical schemes.

**12:10 - 12:30 ISOM'19 Announcement & Photo**

**12:30 - 14:00 Lunch**

## **Tu-I: Emerging Technologies**

**Presiders:** Din Ping Tsai (Academia Sinica, Taiwan)  
Tsutomu Shimura (The University of Tokyo, Japan)

### **Tu-I-01 Invited**

#### **14:00 Thermodynamics of Radiation Pressure and Photon Momentum**

Masud Mansuripur

The University of Arizona (USA)

We present an alternative view of radiation pressure from the perspective of classical thermodynamics, invoking the properties of

blackbody radiation in conjunction with gas-filled cavities that contain electromagnetic energy in thermal equilibrium with the container.

**Tu-I-02 Invited**

**14:25 Temperature Control and Power Generation via Plasmonic Radiative Cooling**

Chih-Ming Wang, Sheng-Rui Wu, Chieh-Lun Chi, Kuan-Lin Lai

National Dong Hwa University (Taiwan)

Potential applications based on the plasmonic radiative cooling are demonstrated. A passive temperature control device based on a switchable mid-infrared metasurface is proposed. For power generation, the Seebeck effect is observed by creating temperature differences via plasmonic radiative cooling.

**Tu-I-03**

**14:50 Solution-Processed Organometal Halide Perovskite for Random Laser Illumination and Imaging**

Tsung Sheng Kao, Yu-Chi Wang, Yu-Heng Hong, Kuo-Bin Hong, Tien-Chang Lu

National Chiao Tung University (Taiwan)

A random laser light source of using the solution-processed metal-halide perovskites for advanced speckle-free imaging has been demonstrated. Moreover, via the active control of the supporting substrates, the lasing performance can be controlled at will.

**15:10 - 15:30 Break**

**Tu-J: Poster Session**

**Presiders:** Osamu Matoba (Kobe University, Japan)  
Nobuhiro Kinoshita (NHK, Japan)  
Takanori Nomura (Wakayama Univ, Japan)  
Masayuki Ono (JVC Kenwood, Japan)

**Odd numbers : 15:30 - 16:30**

**Even numbers: 16:30 - 17:30**

**Tu-J-01**

**Magneto-Optical Cavity Effect on Magnetic Stacked Structures for Hydrogen Gas Sensing Application**

Haruki Yamane<sup>1</sup>, Shingo Takahashi<sup>1</sup>, Kiyoshi Yamakawa<sup>1</sup>, Koki Takahashi<sup>2</sup>, Nobuya Seko<sup>2</sup>, Ken Sumiyoshi<sup>2</sup>, Koji Shigemura<sup>2</sup>, Satoshi Miura<sup>2</sup>

<sup>1</sup>Akita Industrial Technology Center, <sup>2</sup>Tianma Japan, Ltd. (Japan)

The magneto-optical properties of perpendicular magnetic stacked structure were investigated for hydrogen gas sensing applications. Distinct reactions to hydrogen gas were demonstrated by large magneto-optical activities originating from an optical cavity effect.

## **Tu-J-02**

### **Investigation of the Distance Resolution in FMCW-Digital Holography**

Tatsuya Ishikawa, Ken Uchida, Masayuki Yokota  
Shimane University (Japan)

Frequency-Modulated Continuous-Wave technique has been introduced into digital holography. This method can achieve selective reconstruction of an object located at a desired distance. The distance resolution was investigated using both experimental and numerical considerations.

## **Tu-J-03**

### **Metalens for Structured Light**

Mu Ku Chen<sup>1,2</sup>, Cheng Hung Chu<sup>2</sup>, Hsin Yu Kuo<sup>1</sup>, Yu Han Chen<sup>1</sup>, Ren Jie Lin<sup>1</sup>, Tsung Lin Chung<sup>1</sup>, Yi-Teng Huang<sup>1</sup>, Jia-Wern Chen<sup>1</sup>, Din Ping Tsai<sup>1,2</sup>

<sup>1</sup>National Taiwan University, <sup>2</sup>Academia Sinica (Taiwan)

Here we use metalens array for the structured light applications. The advantages of this metadvice is light weight, small, ultrathin, durable. The light spot size is a function with the distance of detector.

## **Tu-J-04**

### **UV Light Focusing by a Surface Plasmonic Lens and the Fabrication of an Integrated Lens Array Applying Nanoimprint Process**

Minoru Takeda<sup>1</sup>, Yusuke Miura<sup>1</sup>, Tsutomu Inoue<sup>1</sup>, Kento Aizawa<sup>2</sup>

<sup>1</sup>Kyoto Institute of Technology, <sup>2</sup>JASCO Corporation (Japan)



We improved the design parameter of the surface plasmonic lens for further extending the focal length keeping subwavelength size focal spot, and fabricated the integrated lens array applying nanoimprint lithography and metal lift-off process.

#### **Tu-J-05**

##### **SOVA Decoding and FIR Filtering for Holographic Memory with Two-Step Exposure Method**

Hikaru Takahashi, Satoshi Honma

University of Yamanashi (Japan)

We propose a method combining error correction technique using a soft output Viterbi algorithm and FIR filtering to recode SQAM signal with the two-step exposure method in holographic memories.

#### **Tu-J-06**

##### **An ACO-Based Two-Dimensional Partial Response Maximum Likelihood Detection Scheme for Holographic Data Storage Systems**

Gyuyeol Kong, Sooyong Choi

Yonsei University (Korea)

A detection scheme for holographic data storage is proposed. By applying ant colony optimization into conventional scheme, we enhance performances with simple structure. Simulation result shows proposed scheme has 4dB gain than conventional scheme.

#### **Tu-J-07**

##### **Lensless Imaging Using a Printed Mask Pattern**

Haruka Saito, Kimihiro Saito

Kindai University Technical College (Japan)

A method to take an image by using a printed mask pattern instead of a lens system was introduced. The inverse filter using the impulse response image works well for the reconstruction.

#### **Tu-J-08**

##### **Lens-Less Volume Holographic Spatial Mode De-Multiplexer**

Shijie Zhou<sup>1</sup>, Atsushi Okamoto<sup>1,4</sup>, Kazuhisa Ogawa<sup>1</sup>, Akihisa Tomita<sup>1</sup>, Taketoshi Takahata<sup>2,4</sup>, Satoshi Shinada<sup>3</sup>, Naoya Wada<sup>3</sup>

<sup>1</sup>Hokkaido University, <sup>2</sup>OPTOQUEST Co., Ltd.,  
<sup>3</sup>National Institute of Information and Communications Technology (NICT),  
<sup>4</sup>OPTOQUEST Advanced Optical Device Development Section (Japan)

To simplify the volume holographic demultiplexer (VHDM), we proposed a lens-less VHDM, in which the essential collective lenses used in the conventional VHDM were removed. We numerically demonstrated its basic operation and reported the results.

#### **Tu-J-09**

##### **Environmentally Robust Phase Detection for Holographic Data Storage**

Kazuyoshi Yamazaki, Masahiro Yamaguchi

Tokyo Institute of Technology (Japan)

Time differential phase detection for robust phase detection against signal intensity deviation and spatial phase variation was newly applied to holographic data storage. The most suitable signal phase values for HDS was revealed.

#### **Tu-J-10**

##### **Experiment on Depth-Direction Multiplexed Signal Generation and Reconstruction in Holographic Memory Using Virtual Phase Conjugation**

Taijun Shiba<sup>1</sup>, Atsushi Okamoto<sup>1</sup>, Yuta Goto<sup>2</sup>, Kazuhisa Ogawa<sup>1</sup>, Akihisa Tomita<sup>1</sup>

<sup>1</sup>Hokkaido University, <sup>2</sup>University of Fukui (Japan)

We have proposed a holographic memory which enables simultaneous recording and reading of holograms in depth direction. In this work, we performed an experiment on generation and detection of a multiplexed signal.

#### **Tu-J-11**

**Withdrawn**

#### **Tu-J-12**

##### **Evaluation of Two and Three-Layer Recording in Multi-Layer and Multi-Valued Optical Memory Using Convex-Shaped Marks**

Xingyu Liu, Xiangyu Quan, Kouichi Nitta, Osamu Matoba

Kobe University (Japan)

Multi-valued recording by using convex-shaped marks in three layers has been investigated numerically. In three-layer recording, 4 bit/layer is available. Minimum SNR can be increased by enlarging the distance between the layers.

## Tu-J-13

### **Pixel-Level Full-Color Routing with Dielectric Metasurfaces**

Hsin Yu Kuo<sup>1</sup>, Bo Han Chen<sup>1</sup>, Pin Chieh Wu<sup>2</sup>, Vin-Cent Su<sup>3</sup>, Yi-Chieh Lai<sup>1,4</sup>, Cheng Hung Chu<sup>1</sup>, Jia-Wern Chen<sup>1</sup>, Yu Han Chen<sup>1</sup>, Mu Ku Chen<sup>1</sup>, Yung-Chiang Lan<sup>4</sup>, Din Ping Tsai<sup>1,2</sup>

<sup>1</sup>National Taiwan University, <sup>2</sup>Academia Sinica, <sup>3</sup>National United University, <sup>4</sup>National Cheng Kung University (Taiwan)

We demonstrate three individual GaN-based metalenses with extremely high operation efficiency at visible light and show the integrated functionality with out-of-plane metalens gives rise to the prospect of CMOS image sensor applications with miniaturized sizes.

## Tu-J-14

### **Radiated Noise Measurement at Wearable Receiver in Intra-Body Communication**

Yuki Sato, Narumi Sekine, Koki Yoshioka, Kenta Nezu, Yutaro Toyoshima, Mitsuru Shinagawa

Hosei University (Japan)

We applied an electro-optical conversion (EOC) probe to measuring radiated noise around a human body in intra-body communication. It was confirmed that the EOC probe was suitable for measurement of the radiated noise.

## Tu-J-15

### **Wavelength Estimation Using Multi-Wavelength Generalized Phase-Shifting Digital Holography**

Masato Kobayashi, Nobukazu Yoshikawa

Saitama University (Japan)

We propose a wavelength estimation method using reconstructed images by the angular spectrum method and the shifted Fresnel

transform method in multi-wavelength DH. Experimental results show that the correct wavelength is estimated by both methods.

## **Tu-J-16**

### **Ground Size Dependence of Wearable Device Performance in Intra-Body Communication**

Yutaro Toyoshima<sup>1</sup>, Narumi Sekine<sup>1</sup>, Mitsuru Shinagawa<sup>1</sup>, Daisuke Saito<sup>2</sup>, Ken Seo<sup>2</sup>, Kyoji Oohashi<sup>2</sup>

<sup>1</sup>Hosei University, <sup>2</sup>Nippon Signal CO., LTD. (Japan)

This paper describes an effect of ground size on wearable device performance in intra-body communication. It was confirmed that the ground size of  $> 2 \text{ m} \times 2 \text{ m}$  was required for measurement reproducibility.

## **Tu-J-17**

### **Electron Beam Addressable Potentiometric Sensor for Ion Distribution Imaging with High Resolution**

Wataru Inami, Kiyohisa Nii, Satoru Shibano, Yoshimasa Kawata

Shizuoka University (Japan)

We have developed an electron beam addressable potentiometric sensor to improve the spatial resolution of ion distribution imaging. By using a focused electron beam, the spatial resolution of the ion distribution image sensor is improved.

## **Tu-J-18**

### **Intelligence Control System Based on Deep Learning Method in Holographic Data Storage System**

Jang Hyun Kim, Hyunseok Yang

Yonsei University (Korea)

We simulate and experiment tilt servo control system by deep learning method in our HDSS. Hence, we acquire good experimental results and performance for tilt servo control in Holographic Data Storage System.

## **Tu-J-19**

### **Phase Detection of SQAM Signal Beam with Sinusoidal Phase Modulation by Transport of Intensity Equation**

Shosei Tateyama, Soichiro Sumida, Masatoshi Bunsen

Fukuoka University (Japan)

We numerically investigate the phase detection of SQAM signal beam by transport of intensity equation. The constellation diagram shows that a sinusoidal-shaped phase distribution is useful for reducing the number of pixels for a symbol.

## Tu-J-20

### **Position Detection Method for Servo Control on Collinear Holographic Memory**

Dongseok Kim<sup>1</sup>, Ryushi Fujimura<sup>2</sup>, Masao Endo<sup>1</sup>, Tsutomu Shimura<sup>1</sup>

<sup>1</sup>The University of Tokyo, <sup>2</sup>Utsunomiya University (Japan)

We proposed a position detection method for servo control on collinear holographic memory. Using this method, position detection of recording medium with an error lower than 20 nm can be successfully achievable.

## Tu-J-21

### **Design of Single-Beam Copying for Real-Image Disk-Type Holography Using a Virtual-Image Type Master Hologram**

Chih-Hung Chen, Yih-Shyang Cheng

National Central University (Taiwan)

We describe how to produce a real-image type reflection hologram from a virtual-image type transmission hologram. Adopting a two-step holographic process, methods of image transformation in disk-type multiplex holography are presented.

## Tu-J-22

### **Room-Temperature Lasing Action of Lead Bromide Perovskite Thin Films via an Anti-Solvent Dripping Process**

Yu-Heng Hong, Yu-Chi Wang, Fang-Chung Chen, Tien-Chang Lu, Tsung Sheng Kao

National Chiao Tung University (Taiwan)

We exploited a consecutive anti-solvent dripping process in solution-processed metal-halide perovskite fabrications. The corresponding emission spectra indicate that the solvent-engineered perovskites can be performed in

room-temperature lasing action with long-time reliability.

#### **Tu-J-23**

**Withdrawn**

#### **Tu-J-24**

##### **Total-Variation Regularization for Surface Topology of Step Height in Fourier Ptychographic Microscopy**

Guk-Jong Choi<sup>1</sup>, Sungbin Jeon<sup>1</sup>, Jin-Sang Lim<sup>1</sup>, Janghyun Cho<sup>1</sup>, Hyun Choi<sup>2</sup>, No-Cheol Park<sup>1</sup>

<sup>1</sup>Yonsei University, <sup>2</sup>Konyang University (Korea)

In this study, we propose TV regularization method for reflective Fourier ptychographic microscopy (FPM). The objective of this study is improving the quality of the phase retrieval about step-height sample, which is verified through experiment.

#### **Tu-J-25**

##### **Spatial Quadrature Amplitude Modulation Signal with Orthogonal Code for Holographic Memories and Two-Step Exposure Method**

Satoshi Honma, Hikaru Takahashi, Haruki Watanabe

University of Yamanashi (Japan)

We proposed a method providing a complex amplitude data, which is consist of spatial multiplexed signals with orthogonal code, to improve the reconstruction quality of the SQAM signal with TEM.

#### **Tu-J-26**

##### **Parallax Image Reconstruction in 3D Display Using Binary-Phase-Modulation Spatial Light Modulator**

Takahiro Uemae<sup>1</sup>, Xiangyu Quan<sup>1</sup>, Kouichi Nitta<sup>1</sup>, Shinya Sato<sup>2</sup>, Nobuyuki Hashimoto<sup>2</sup>, Osamu Matoba<sup>1</sup>

<sup>1</sup>Kobe University, <sup>2</sup>CITIZEN Watch Co., Ltd. (Japan)

We present two different perspective views to be observed by both eyes for 3D display system using a high-speed ferroelectric liquid crystal spatial light modulator. Reconstructed images are presented numerically and experimentally.

**Tu-J-27**

**Synthesizing Complex Amplitude Data with Multiple Intensity Pages for Holographic Memory**

Haruki Funakoshi, Satoshi Honma

University of Yamanashi (Japan)

In this report, we propose a method to synthesize a recording page data from a number of intensity page data based on computer holographic technique by using linear phase codes.

**Tu-J-28**

**Plasmon-Enhanced Two-Photon Absorption in Single Crystalline Organometallic Bromide Perovskites**

Pin-Yu Kung, Yu-Heng Hong, Fang-Chung Chen, Tsung-Sheng Kao

National Chiao Tung University (Taiwan)

We intend to synthesize environmentally sustainable single crystalline lead-bromide perovskite bulks, investing their specific optical nonlinearities. Meanwhile, corresponding plasmonic nanostructures will be further designed and fabricated onto the perovskite single crystals, enhancing light-emitting performance.

**Tu-J-29**

**Sensing of Wavefront Curvature Using Computer-Generated Holograms: Mathematical Modelling**

S. B. Odinokov<sup>1</sup>, E. Yu. Zlokazov<sup>1,2</sup>, M. S. Kovalev<sup>1</sup>, G. Krasin<sup>1</sup>

<sup>1</sup>Bauman Moscow State Technical University, <sup>2</sup>National Research Nuclear University (Russia)

Modern commercially available optical components such as low RIN lasers, high resolution spatial light modulators, high sensitivity photo-detectors together with high speed digital processing techniques provide the possibility to construct a powerful devices for sensing or processing of two-dimensional optical signals with high efficiency.

**Tu-J-30**

**Equalization Scheme Based on Multi-Layer Perceptron with Misalignment Estimation for Holographic Data Storage Systems**

Seongbae Han, Gyuyeol Kong, Sooyong Choi  
Yonsei University (Korea)

This paper proposes a equalization scheme with the misalignment estimation based on the multi-layer perceptron (MLP) for holographic data storage systems. The misalignment estimation and compensation based on MLP improves the bit error rate performances.

**Tu-J-31**

**Two-Step Holographic Method with Extended Vertical Viewing Window for Reflection Disk-Type Multiplex Holography**

Yih-Shyang Cheng, Chih-Hung Chen, Yu-Hsin Tu

National Central University (Taiwan)

With the aid of a diffuser and the use of a diverging object-beam system, master holograms with extended viewing window and lager object can be obtained. Image transformation for fabricating reflection transfer holograms is presented.

**Tu-J-32**

**Invasiveness Estimation of Electro-Optic Probe by Using Electro-Magnetic Field Simulator**

Tomoya Naoe<sup>1</sup>, Mitsuru Shinagawa<sup>1</sup>, Jun Katsuyama<sup>2</sup>, Hiroaki Tanaka<sup>2</sup>, Yoshinori Matsumoto<sup>2</sup>, Yoshiaki Tanaka<sup>2</sup>

<sup>1</sup>Hosei University, <sup>2</sup>Yokogawa Electric Corporation (Japan)

This paper describes invasiveness estimation method of an electro-optic crystal on electric field by using electro-magnetic field simulation. It was confirmed that our proposed method can be applied to estimating the invasiveness of the crystal.



**Tu-J-33**

**Image Reconstruction Simulation by Spatial Cross Modulation Method with Single Lens and Random Diffuser**

Hisatoshi Funakoshi<sup>1</sup>, Atsushi Okamoto<sup>2</sup>

<sup>1</sup>Gifu University, <sup>2</sup>Hokkaido University (Japan)

An image reconstruction simulation for a new simple optical system of the spatial cross modulation method was conducted. The results show that it has the potential to achieve large and high quality object reconstruction.

**Tu-PP-01**

**Simulation on Eigenmodes of Semiconductor Ring Resonator with Metal Nano-Antenna for HAMR Heat Source**

Ryuichi Katayama<sup>1</sup>, Satoshi Sugiura<sup>2</sup>

<sup>1</sup>Fukuoka Institute of Technology, <sup>2</sup>InnovaStella, Inc. (Japan)

The eigenmodes and light intensity distribution of a novel device for heat-assisted magnetic recording heat source, which consists of a GaAs ring resonator and a Au nano-antenna, were simulated using the finite element method.

**Tu-PP-02**

**An Extended Pulse Position Modulation for Visible Light Communication with Flicker Suppression**

Hiroyuki Nakayama, Jiro Morimoto

Tokushima Bunri University (Japan)

A novel transmission technique that achieves high communication efficiency, low flicker and wide dimming control range is proposed. The performance of the proposed method is evaluated by the simulation.

**17:30 - 18:00 Break**

**18:00 - 20:00 Banquet**

## **October 24, 2018 (Wednesday)**

### **We-K: Digital Holography 2**

**Presiders:** Xiaodi Tan (Fujian Normal University, China)  
Osamu Matoba (Kobe University, Japan)

#### **We-K-01 Invited**

##### **09:00 Single-Shot Phase-Shifting Incoherent Digital Holography Using Multiplexed Phase Gratings**

Teruyoshi Nobukawa, Yutaro Katano, Tetsuhiko Muroi, Nobuhiro Kinoshita, Norihiko Ishii

Japan Broadcasting Corporation (NHK) (Japan)

Our proposed single-shot phase-shifting incoherent digital holography can simultaneously capture four self-reference holograms and reconstruct 3D images with numerical back propagation. The effectiveness of our proposed method was numerically and experimentally verified.

#### **We-K-02 Invited**

##### **09:25 A Dual-Wavelength Light Source Based on Quantum-Dot Film for Digital Holographic Microscopy**

Young-Joo Kim, Se-Hwan Jang, Sungbin Jeon, Jae-Yong Lee, Jinsang Lim, No-Cheol Park

Yonsei University (Korea)

A dual-wavelength light source was developed by converting blue LED to dual-red-wavelengths using quantum-dots of different sizes. This compact light source has an advantage of little speckle with relatively wide range and high resolution in digital holographic microscopy.

#### **We-K-03**

##### **09:50 Higher Vibration Frequency Measurement Capability of Sound Field Imaging by High-Speed Digital Holography**

Sudheesh K. Rajput<sup>1</sup>, Osamu Matoba<sup>1</sup>, Yasuhiro Awatsuji<sup>2</sup>

<sup>1</sup>Kobe University, <sup>2</sup>Kyoto Institute of Technology (Japan)

We present higher frequency measurement capability of sound field imaging by digital

holography upto 20 kHz. Holograms of vibration sound emitted by object are recorded and frequency determination of higher audible range is confirmed.

**We-K-04**

**10:10 Particle Depth Position Detection Using Phase Signature in Phase-Retrieval Holography**

Atsuo Kubonishi, Yohsuke Tanaka, Shigeru Murata

Kyoto Institute of Technology (Japan)

We evaluate particle depth positions using phase signature in phase-retrieval holography in experiment to confirm the suppression of particle elongation.

**10:30 - 10:50 Break**

**We-L: Computational Imaging (Special Session)**

**Presiders:** Yusuke Nakamura (Hitachi, Ltd., Japan)  
Tetsuhiko Muroi (NHK, Japan)

**We-L-01 Invited**

**10:50 Computational Photography**

Hajime Nagahara

Osaka University (Japan)

Computational photography is a new research area that combines imaging optics and processing for the digital imaging. The combination of the hardware and software give us more flexibility for solving the problems in computer vision and image processing and drastic improvements.

**We-L-02 Invited**

**11:15 Light-Field Optics and Unique Applications**

Toru Iwane

NIKON CORPORATION (Japan)

Conditions of rays in space are recorded on 2D plane as light-field data and reconstructed back from the data using light-field optics. With this transforming method, several unique optical systems can be proposed.

**We-L-03 Invited**

**11:40 Computational Microscopy toward Light-Field Acquisition and Super-Resolution**

Shin Usuki, Kenjiro T. Miura

Shizuoka University (Japan)

For the purpose of advanced optical imaging, computational microscopy employs diverse functions which include multiple apertures, multiple illuminations, multiple translations, and so on. Then adequate computations are performed toward light-field acquisition and super-resolution in imaging.

#### **We-L-04**

##### **12:05 Numerical Autofocusing Based on Adaptive Sharpness Evaluation for Complex Amplitude Imaging**

Koshi Komuro<sup>1</sup>, Kazusa Oe<sup>1</sup>, Yosuke Tamada<sup>2</sup>, Takanori Nomura<sup>1</sup>

<sup>1</sup>Wakayama University, <sup>2</sup>National Institute for Basic Biology (Japan)

An adaptive autofocusing method is proposed to measure simultaneously depth positions and complex amplitude of objects. The calculation area of local sharpness evaluation is adaptively used. An optical experiment confirms the effectiveness of the method.

#### **We-L-05**

##### **12:25 Towards High-Speed Computational Ghost Imaging Using Holographic Optical Correlator**

Ayano Inoue<sup>1</sup>, Ren Usami<sup>1</sup>, Keisuke Saito<sup>1</sup>, Yasunobu Honda<sup>1</sup>, Kanami Ikeda<sup>2</sup>, Eriko Watanabe<sup>1</sup>

<sup>1</sup>The University of Electro-Communications, <sup>2</sup>Osaka Prefecture University (Japan)

We propose a computational ghost imaging system by using optical correlator. In the preliminary experiments, the reconstructed images of the object pattern are found to be in good agreement with those obtained by numerical simulations.

#### **12:45- 14:15 Lunch**

#### **We-M: Automotive**

**Presiders:** Akinori Furuya (Tokushima Bunri University, Japan)

Masatoshi Bunsen (Fukuoka University, Japan)

**We-M-01 Invited**

**14:15 Toward Fully Automated Vehicle –Overview of Our Activities and Current Status–**

Naoki Suganuma

Kanazawa University (Japan)

We have developed autonomous vehicles for about more than twenty years and conducted public road testing at many places. In this presentation, the overview of our activities and current status will be presented.

**We-M-02 Invited**

**14:40 Automotive Time-of-Flight LiDAR Systems Using MEMS Scanners**

Kazutoshi Kitano, Yousuke Koutsuka, Risa Tanimoto, Chihiro Kawabata, Shunsaku Noda, Yasuo Tanahashi, Yukio Hayashi, Kunihiko Horikawa, Eiji Muramatsu

Pioneer Corporation (Japan)

The concept, design and characterization of time-of-flight LiDAR systems with MEMS scanners for automotive applications are presented. Multiple types of coaxial optics with the common ranging system are studied to meet various demands.

**We-N: Applications of Holographic Optical Elements (Special Session)**

**Presiders:** Akinori Furuya (Tokushima Bunri University, Japan)  
Masatoshi Bunsen (Fukuoka University, Japan)

**We-N-01 Invited**

**15:05 Development of Doped Photopolymers for Holographic Memory**

Shiuan Huei Lin, Vera Marinova, Ken Y. Hsu

National Chiao Tung University (Taiwan)

In this talk, we first review our investigations on the doped photopolymers. The material design strategy and fabrication of thick polymer samples with negligible shrinkage and good optical quality are described. In addition, we will present novel volume holographic recording in our photopolymer materials with different doped elements. Some photonic applications, including holographic memory, will be demonstrated.

**We-N-02 Invited**

**15:30 Formation of Holographic Memory with Temperature-Resistant Properties in Liquid Crystal Composites for Optically Reconfigurable Gate Arrays**

Akifumi Ogiwara

Kobe City College of Technology (Japan)

Thermally stable holographic memory formed by liquid crystal (LC) and LC diacrylate monomer is proposed to achieve the reconstruction of context information for optically reconfigurable gate arrays at high temperatures more than nematic to isotropic phases.

**We-N-03 Invited**

**15:55 AR Display System with Holographic Waveguide Element**

Wei-Chia Su<sup>1</sup>, Wen-Kai Lin<sup>1,2</sup>, Shao-Kui Zhou<sup>1,2</sup>, Bor-Shyh Lin<sup>2</sup>

<sup>1</sup>National Changhua University of Education,

<sup>2</sup>National Chiao Tung University (Taiwan)

AR display systems based on holographic waveguide elements are presented. We have demonstrated different types of holographic waveguide elements for AR display. The image aberrations induced by holographic waveguide element are also discussed.

**We-PD: Post Deadline**

**Presiders:** Wan-Chin Kim (Hanbat National University, Korea)

Tsutomu Shimura (The University of Tokyo, Japan)

**We-PD-01**

**16:20 Low-Noise Reference-Free Implementation of Differential Mode Delay Measurement Using Single Mode Fiber as Higher-Order Mode Filter**

Shogo Hoshino<sup>1</sup>, Atsushi Okamoto<sup>1</sup>, Kazuhisa Ogawa<sup>1</sup>, Akihisa Tomita<sup>1</sup>, Yuta Wakayama<sup>2</sup>, Takehiro Tsuritani<sup>2</sup>

<sup>1</sup>Hokkaido University, <sup>2</sup>KDDI Research, Inc. (Japan)

We experimentally demonstrated low-noise

reference-free implementation of differential mode delay measurement via low-coherence digital holography by using a single mode fiber as a higher-order mode filter.

## **We-PD-02**

### **16:35 Evaluation of Power Equalization of Laguerre-Gaussian Mode Based on Phase-Intensity-Phase Modulation**

Zihan Zhou<sup>1</sup>, Atsushi Okamoto<sup>1</sup>, Kazuhisa Ogawa<sup>1</sup>, Akihisa Tomita<sup>1</sup>, Yuta Wakayama<sup>2</sup>, Takehiro Tsuritani<sup>2</sup>

<sup>1</sup>Hokkaido University, <sup>2</sup>KDDI Research, Inc. (Japan)

This study proposes the power equalization of Laguerre-Gaussian (LG) modes using phase-intensity-phase (PIP) modulation. As a result, the highly accurate power equalization among each mode is confirmed.

### **16:50 - 17:05 Award & Closing**

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#### **Domestic flights** (国内線)

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(From Shin-Osaka to Kokura)

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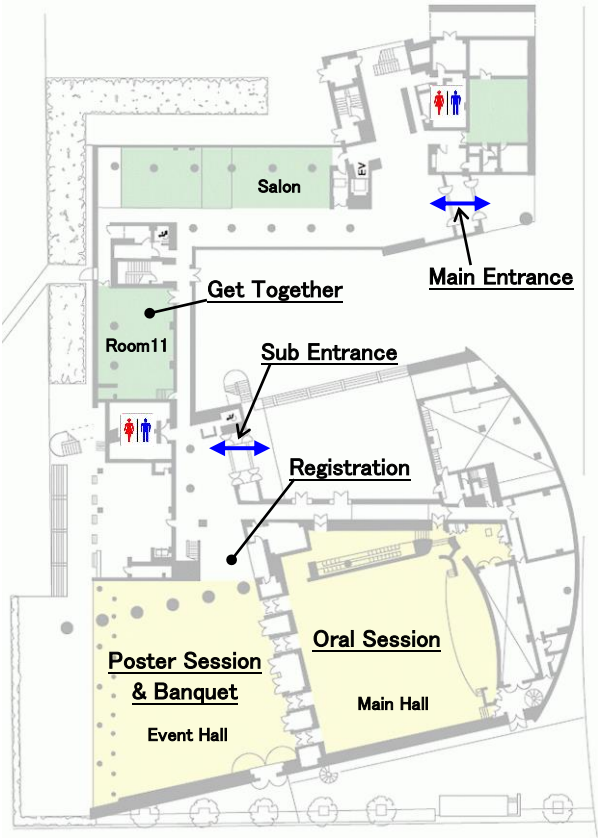
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# CONFERENCE SITE FLOOR

## Kitakyushu International Conference Center Floor Map

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## HOTEL ACCOMMODATIONS

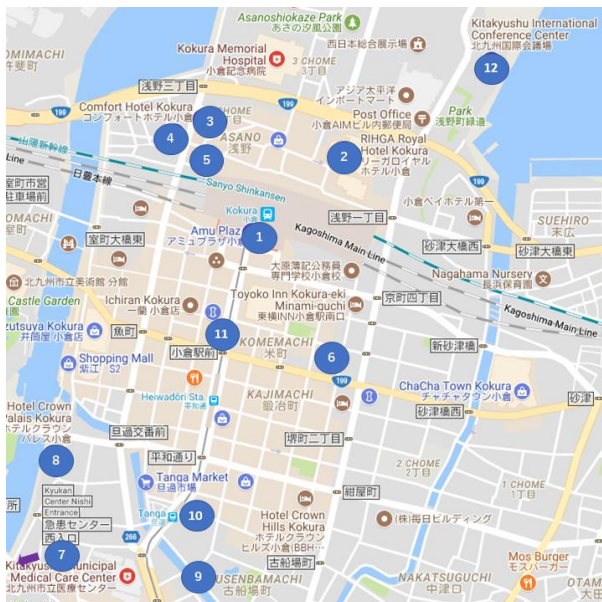
There are a lot of online booking sites in Japan. As the example, some of them are listed below. You can reserve your rooms in English at these sites. ISOM does not prepare any special blocks of rooms for the participants.

- JAPANiCAN.com  
<http://www.japanican.com/>
- Japan Traveler Online  
<http://japantraveleronline.com/>
- Rakuten Travel  
<http://travel.rakuten.com/>
- Hotels.com  
[https://www.hotels.com/?pos=HCOM\\_ASIA&locale=en\\_JP](https://www.hotels.com/?pos=HCOM_ASIA&locale=en_JP)

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- ASANO HOTEL  
<http://www.kiteyone.net/asanohotel/asanohE/main.html>
- COMFORT HOTEL KOKURA  
<https://www.choice-hotels.jp/hotel/kokura/>
- JR KYUSHU HOTEL KOKURA  
<http://www.jrk-hotels.co.jp/en/Kokura/>
- NISHITETSU INN KOKURA  
<http://inn-kokura.nishitetsu-hotels.com/en-gb/>
- HOTEL HARMONIE CINQ  
<http://harmonie-hotel.jp/fukuoka/>
- HOTEL CROWN PALAIS KOKURA  
<https://www.crownpalais.jp/kokura/en/>
- HOTEL NEW TAGAWA  
<http://www.hotel-newtagawa.co.jp/>
- PREMIER HOTEL MOJIKO  
<http://premierhotel-group.com/mojikohotel/english/>

# CITY AND HOTEL MAP



- ① STATION HOTEL KOKURA
- ② RIHGA ROYAL HOTEL KOKURA
- ③ ASANO HOTEL
- ④ COMFORT HOTEL KOKURA
- ⑤ JR KYUSHU HOTEL HOTEL KOKURA
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- ⑦ HOTEL HARMONIE CINQ
- ⑧ HOTEL CROWN PALAIS KOKURA
- ⑨ HOTEL NEW TAGAWA
- ⑩ HOTEL 1-2-3 KOKURA
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