ISOT 2016

International Symposium on Optomechatronic Technology

Itabashi Tokyo

November 7-9, 2016
Itabashi Culture Hall

Conference Digest

International Society for Optomechatronics

Itabashi City

Sponsors

Technical Committee for Mechano-Photonics
The Japan Society for Precision Engineering

Utsunomiya University

Japan Optomechatronics Association

Mitutoyo Association for Science and Technology (MAST)

ISOT 2016

International Symposium

on

Optomechatronic Technology

November 7-9, 2016
Itabashi Culture Hall, Itabashi, Tokyo, Japan

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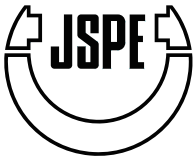
Organized by

International Society for Optomechatronics (ISOM)

Steering Committee of International Society for Optomechatronics



Technical Committee for Mechano-Photonics
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Message from the General Chair

We are delighted to welcome you to the International Symposium on Optomechatronic Technology (ISOT 2016 Itabashi Tokyo). It has started at Boston (USA) at the part of SPIE's Photonics East in 2000, then every year we moved to different venues, such as Boston (USA) in 2001, Stuttgart (Germany), Boston (USA), Boston (USA), Sapporo (Japan), Providence (USA), Lausanne (Switzerland), San Diego (USA), Istanbul (Turkey), Toronto (Canada), Hong Kong (China), Paris (France), Jeju (Korea), Seattle (USA), and Neuchâtel (Switzerland) in 2015. This year will be the 17th time. Optomechatronics is an interdisciplinary field of engineering working on systems that consist of mechanical, electrical and optical components synergistically integrated and based on mutual exchange of energy and information. The ISOT 2016 Itabashi Tokyo aims to provide in the field of optomechatronic such as optical metrology, optomechatronics for microscopes, laser/fiber optics, optofluidics, micro optoelectro mechanical systems (MOEMS), bio-medical imaging, adaptive optics, visual motion tracking and control, machine vision/optical imaging, optical and vision-based monitoring/control, optical-based sensors and actuators, material laser processing, 3D processing, and 3D display/3D printer. It is our pleasure to inform you that the International Society of Optomechatronics (ISOM) will be established this year. There will also be a special events during the symposium.

Finally, we would like to extend our thanks to all presenters and participants of the ISOT 2016, Itabashi Tokyo for their contribution to the success of the conference. In addition, we cannot forget the big local supports by the Itabashi City called "the city of Optics". We also express our thanks to exhibitors and sponsors. We hope that you enjoy your time at the symposium and Japanese culture.

Professor Yukitoshi OTANI
General Chair of ISOT 2016, Itabashi Tokyo
CORE /Department of Optical Engineering, Utsunomiya University

Message from Mayor of Itabashi City

板橋区は、日本の首都東京の中心から北部に位置し、製造業のさかんな産業都市として知られています。その歴史は、1876 年に設立された陸軍の火薬工場に始まります。以来、板橋区に多くの軍需工場が建てられ、とくに光学兵器を製造するために板橋区に多くの技術者が集められました。

1945 年、日本に平和の時代が訪れると、それらの技術者たちが板橋の地に工場を立ち上げ、さまざまな分野の技術者たちが協力しあいながら、双眼鏡をはじめとする光学製品を次々と開発・製造していきました。「Made in Itabashi」の製品は日本の花形産業となり、高度経済成長を牽引しました。板橋区が「光学のまち」といわれる所以であり、現在でも多くの光学精密機器メーカーが活躍しています。

このような歴史や実力を踏まえ、板橋区産業の求心力を高めるためのブランドの構築を進めています。その大きな取組の一つが、国際会議の招致です。2014 年には「光学設計・製造に関わる国際会議（ODF）」を招致し、昨年には日本光学会光設計研究グループ・理化学研究所・宇都宮大学との連携による合同の研究会「板橋オプトフォーラム（IOF）」中で「日中の超精密加工に関する国際会議（CJUMP2015）」を招致しました。そして今年、板橋区にとって 3 回目の国際会議である「ISOT2016」を招致することができました。板橋区の企業にとっても関心の高いオプトメカトロニクスの研究者や技術者の方々がこの板橋区で一堂に会されることを誠に光栄に存じ上げるとともに、かつてこの板橋の地で光学技術者たちが花形産業を生み出したように、新しい技術や産業がこの会議を契機に芽生え、花開くことを期待いたします。

Itabashi City is located in the central to northern part of Tokyo, the capital of Japan and well known as an industrial city with the active manufacturing industry. Its history started with an explosives manufacturing plant for the Army established in 1876. Since then, many munitions plants have been founded and particularly, many engineers have been called together to Itabashi, in order to manufacture optical weapons.

After the war ended in 1945 and a peaceful time began, those engineers established plants in the Itabashi area, and they started to develop and manufacture optical products including binoculars one after another, in mutual cooperation with engineers in various fields

Made-in-Itabashi products have formed a Japan's prominent industry and have taken the lead in high economic growth. It is the reason why Itabashi City is called "the City of Optics", and even now a plenty of precision optical instrument manufacturers continue to be actively operating.

Based on such a history and achievements, we are further advancing to establish brands to reinforce the centripetal force of the Itabashi industry. One of those activities is to invite international conferences. In 2014, we hosted "International Conference on Optical Design and Manufacture (ODF)", and last year, "China-Japan International Conference on Precision Machining Process (CJUMP2015)" was invited in the joint study group "Itabashi Opto Forum (IOF)" in collaboration with the Optics Design Group of the Optical Society of Japan, the Institute of Physical and Chemical Research and Utsunomiya University.

This year again, we could invite "ISOT2016" as the third international conference for Itabashi City. I am greatly honored to welcome researchers and engineers for optomechatronics getting together in Itabashi City in which companies in Itabashi are interested very much. I expect also that new technologies and industries will emerge and bloom with this conference as a momentum, the same as optical engineers having given birth to the prominent industry in the past in this place of Itabashi.

Thank you.

坂本　健

Takeshi SAKAMOTO
Mayor of Itabashi City

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Keiko Kawano

Otani Laboratory, Department of Optical Engineering, Utsunomiya University

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Announcement of the Formation of the International Society for Optomechatronics (ISOM)

Optomechatronics is an interdisciplinary field of engineering working on systems that consist of mechanical, electrical and optical components synergistically integrated and based on mutual exchange of energy and information. Many optomechatronic systems incorporate control loops, resulting in robustness against external interferences and partially autonomous operation.

Optomechatronic systems can be found in many application areas, such as industrial production, automotive technology, air- and space-technology, medical devices and consumer goods. Examples of optomechatronic systems are:

- Vision guided robots
- Laser machining systems
- Autonomous vehicles
- Optical storage devices (CD, DVD, ⋯)
- Laser printers
- Digital cameras with active optics (auto iris, autofocus, zoom lens, ⋯)
- Scanning microscopes
- Endoscopic devices
- Adaptive optics e.g. in astronomy

In contrast to the immense impact of optomechatronics on technology and economy it is hardly noticed by the general public. Enhancing the public visibility of optomechatronics would make it more attractive for young scientists and engineers.

The development of optomechatronic devices and systems and their implementation into problem-solving applications requires a profound knowledge in the fields of mechanics, electronics, optics and information technology as well as experience in system engineering. Currently this is not covered by existing study programs. Graduates of electrical engineering, mechanical engineering or physics therefore often have to complement their knowledge on their own.

Being aware of these present shortcomings in 2015 an international group of scientists decided to establish the International Society for Optomechatronics (ISOM). The mission of this society is to

- Disseminate the information about optomechatronics to the general public as well as to the scientific community
- Establish platforms for members to meet and discuss ideas
- Establish guidelines for education programs for students as well as for professionals
- Support international scientific cooperation

ISOM is still in a state of development. Individuals willing to join the society and to contribute to its progress are welcome. You will find additional information and news on

www.optomechatronics.org

Prof. Dr.-Ing. Rainer Tutsch
Technische Universität Braunschweig, Germany
President of ISOM

Prof. Dr. Yukitoshi Otani
Utsunomiya University, Japan
General Secretary of ISOM

Plenary Lecture

Holography in Mechanical Engineering

Jumpei TSUJIUCHI

Professor Emeritus, Tokyo Institute of Technology, Tokyo

1. Introduction

The basic idea of holography was shown by D. Gabor in 1948. He had an idea of adding a uniform phase component in Bragg X-ray microscopy, and X-ray Fraunhoher diffraction pattern of a crystal was photographed. This photograph was again Fraunhofer diffracted by visible light and the final image was recorded. Thus, he succeeded to have a real image in amplitude but this phase component was overlapped the image and the visible image given by intensity distribution of the final image still had noises.

In 1962-3, E. Leith and J. Upatnieks succeeded to separate these unnecessary noises from the image. In recording a hologram of a transparency of continuous tone object, they used a laser light just invented and added an inclined uniform beam as a reference beam to the object beam. Therefore, in the reconstruction process, when a beam similar to reference beam illuminated the hologram, reconstructed image was spatially separated, and the final image was obtained without any unnecessary noise.

2. Basic Properties of Holography

Mathematical expressions of hologram recording and reconstruction are shown and properties of thin and thick holograms are given. In connection with this treatment, an interesting property of thick hologram and diffraction efficiency of hologram are introduced. Mechanism of recording wavefront and image formation in holography are expressed, and usually used recording materials of hologram together with their properties for practical purpose are shown. Some examples of hologram are described.

3. Digital Holography

Most recording materials of hologram have their merits and demerits, and they are widely used considering their properties. The most popular material is photographic film/plate. However, according to the narrow spread of hologram, most of major photographic film/plate makers withdrew from the production, and recently a new field of hologram recording called “digital holography” was born. In this technique, electronic imaging sensor such as CCD, CMOS are employed for recording holograms. In these sensors, the total picture element number is limited, and their spatial frequency is also small, so hologram should be in-line Gabor-type hologram. Considering a few imaging devices in the market, maximum angle of the reference beam against the optical axis of the object should be less than 2.5, and the viewing angle of the object will be very small. This means that it is very difficult to record/reconstruct large size objects.

To avoid such difficulty, some additional optical systems should be installed between object and hologram. This means that the digital holography system should be limited for only small objects or transparent phase objects. Some examples of the hologram recording setup were shown.

4. Holographic and Speckle Interferometry

The most attractive application of holography in mechanical engineering would be holographic interferometry. There are two methods of holographic interferometry: “double-exposed holographic interferometry” and “real-time holographic interferometry”.

Many kinds of measurement were made, i.e. growth of plants, elastic deformation of rotating fan, 3D amounts of distortion by computer, etc..

Continuous vibrating object can be measured by the holographic interferometry. 2 kinds of measurement are possible, one is average interferometry of stable vibration such as musical instruments, the other one is stroboscopic vibration by synchronous modulation of reference beam, i.e. a stroboscopic measurement by modulating reference beam with object vibration. Such a static or dynamic distortion measurement will be a powerful means for non- destructive testing, and application to airplanes seems very attractive for safety operation.

If rough surface is illuminated by laser beam, very complicated random patters appear, and this is called “speckle pattern”. If this speckle pattern generated by a diffuse surface (transmitted or reflected) and two speckle patterns overlapped in a plane, a fringe-like pattern can be observed, and possible to treat similarly to

interference fringes. It is so-called speckle interferometry, and possible to use for deformation measurement. In addition, to record speckle fringes, any high resolution photosensitive material or equipment is not necessary and an electronic imaging equipment such as TV camera can be used, and this is very convenient for electronic imaging system which can be easily connected to computer processing. This technique is used for deformation measurement as well as non-destructive testing, which seems important for airplane safety check.

A contour mapping of objects can be easily made by holographic interferometry. Several types of the method are reviewed.

An interesting measurement technique is camera vibration measurement. A ground glass is set just in front of a photographic camera, and very high resolution film (for example hologram recording film) is set in the image plane. If camera shutter operates, the image of speckle is recorded in the film. After developed the film, and illuminate a spot in the film by laser beam, straight periodic fringes can be seen in the focal plane of a collimator, and the period of the fringes is inversely proportional to the amount of camera motion during an exposure. This technique is the best method to measure the camera shift during the exposure.

5. Noise Source Detection

Another interesting technique can be found for detecting noise source of moving mechanical instruments. Two microphones are used: One is a scanning microphone moving regularly in a large plane frame, and the other microphone is fixed. When machine is moving, electronic signals from these two microphones are fed into electronic correlator thorough electronic narrow band-pass filter. Output of correlator signal are plotted in a plane corresponding to the scanning plane, one will have an acoustical Fresnel hologram of the noise. Then, this hologram is reconstructed by computer, and a noise source distribution map of the machine can be seen. After theoretical consideration, it was concluded that this reconstructed image is the reconstructed image of the noise in acoustical hologram if noise source is nearly coherent, and reconstructed image is the amplitude distribution of the source, accordingly, intensity distribution is obtained by squaring of the result. Even in case of spatially incoherent noise source, the image can be obtained, and image becomes the intensity distribution of the noise source. This is a van Citter-Zernike's case, and this is similar to Hunbry Brown-Twiss stellar interferometry. This noise detection technique has been used for gear dynamics measurements in Precision Instruments Laboratory, Tokyo Institute of Technology

6. Closing Remarks

Some statistical diagrams showing activity of holography are shown. These statistics were arranged in the period 1950 - 2005, and unfortunately recent results were not included. However, one can understand the general tendency of the development of holography from these statistics.

Plenary Lecture

Optical Lattice Clocks: Seeking for a New Second

Hidetoshi KATORI
Professor, Department of Applied Physics, The University of Tokyo, Japan
Quantum Metrology Laboratory, RIKEN, Japan
Innovative Space-Time Project, ERATO, Japan Science and Technology Agency

Optical lattice clocks benefit from a low quantum-projection noise limit by simultaneously interrogating a large number of atoms that are trapped in an optical lattice tuned to the "magic wavelength", where light shift perturbation in the clock transition is largely cancelled out. They have reached instabilities at the level of 10^{-16} at one second either by applying ultra-stable lasers or by rejecting the laser noise with synchronous interrogation schemes. Such stabilities allow achieving 10^{-18} uncertainty in a few hours of clock operation, which expedites investigation of systematic uncertainties, such as collisional shift, multipolar and higher order light shifts in the optical lattice, and the blackbody radiation shift. These evaluations have allowed optical lattice clocks to reach inaccuracies approaching 10^{-18}. Although the primary caesium standards continue to improve their systematic uncertainties down to 1.1×10^{-16}, it is now the uncertainty of the SI second itself, that restricts the measurement of the absolute frequencies of optical standards. Direct comparisons of optical clocks are, therefore, the only way for optical clocks to investigate their superb performance beyond the current SI limit.

While comparison of two clocks referring to the same atomic transition facilitate investigation of systematic uncertainties as well as the clocks'stability, two such clocks operated at distant laboratories connected by a phase-stabilized fibre link can be a tool to measure the gravitational potential difference via the general-relativistic frequency shift. On the other hand, comparisons of clocks based on different atomic elements will determine a frequency ratio with higher precision than absolute frequencies based on the SI second. Such frequency ratios can be shared with full accuracy and tested in any laboratory across the world, which will be collected to form a "frequency matrix" to complement the list of secondary representations of the second. Such a matrix would allow the calculation of synthetic values for frequency ratios that have not yet been measured directly as well as improved consistency checks. These efforts should be an essential step towards a redefinition of the SI second. In addition, a collection of frequency ratios over time will provide an invaluable resource in the search for a temporal variation of the fundamental constants.

In this presentation, we report on frequency comparisons of optical lattice clocks with neutral strontium (Sr), ytterbium (Yb) and mercury (Hg) atoms. By referencing cryogenic Sr clocks with uncertainty of 7×10^{-18}, we determine frequency ratios, ν Yb/ν Sr and ν Hg/ν Sr, of a cryogenic-Yb clock and a Hg clock with uncertainty smaller than 1×10^{-16}, i.e., better than the current SI limit. We also present remote comparisons between cryogenic Sr clocks located at RIKEN and the University of Tokyo over a 30-km-long phase-stabilized fibre link, which allows determining the height difference of the two clocks with an uncertainty of 5 cm via the gravitational red shift.

※ *There are many valuable references. Please see the online proceedings.*

Attendee Guideline

1 Official Language

The official language of ISOT 2016 is English.

2 For all attendee

2.1 Conference venue

Itabashi Culture Hall (located at 35 ° 44'58.2"N 139 ° 42'18.9"E)
ISOT 2016 will be held at the Itabashi Culture Hall in Itabashi, Tokyo. The conference center is located in Oyama area, where two big shopping streets are famous: "Yuza Oyama" "Happy Road Oyama".

2.2 Registration

Location of registration: Entrance Hall of culture center.
Time of registration: Nov. 6 17:30 - 21:00, Nov.7 8:30 - 18:00, Nov. 8 9:00 - 17:00, Nov. 9 9:00 - 16:00

2.3 Internet service

Wireless internet service is available during the conference at 2nd and 4th floor in the culture hall. Network setting information will be provided in the notice board at the registration desk.

2.4 Lunch

You can use your lunch ticket at RESTAURANT "MAKI" on B1 floor. Ticket Fee is already included in the conference registration fee.

2.5 Coffee break

You can make international connections by taking a coffee break during intermissions on the floor of Hall 2.

2.6 Japanese tea ceremony

Place: 5th floor
Time and Date: 11:00-11:30, 13:30-14:00, 15:30-16:00 in Nov. 8.
The Japanese tea ceremony is called Chanoyu, Sado or simply Ocha in Japanese. We promise you will have valuable experiences. Free of charge.

2.7 "KABUTO" - Japanese "SAMURAI" armor

Place: 5th floor
Time and Date: 11:00-17:30 in Nov. 7 and 8.
Have you ever wished to be a samurai? Japanese "SAMURAI" armor will be exhibited. You can touch and wear a SAMURAI warrior. Lets' take pictures.

2.8 Get Together

Place: Western Restaurant Pino at Dai-ichi Inn Ikebukuro near the JR Ikebukuro station.
Time and Date: 18:00 - 20:30 in Nov. 6.
You can refresh and make international relations while taking light meal and drinks. Fee is already included in the conference registration fee.

2.9 Welcome reception

Place: Hall 2 on the 4th floor
Time and Date: 18:30 - 20:30 in Nov. 7.
All attendees of ISOT 2016 are invited to Welcome reception. Fee is already included in the conference registration fee.

2.10 The ISOT 2016 "Yakata-bune" banquet

Place: Asashio Boat pier, 3-1-1 Harumi, chuo-ku. (5 minutes from Exit A3 of Kachidoki Station on the Toei Oedo line.)
Time and Date: 18:00 - 21:00, Nov.8.
Bus pickup: 17:10 near the place of Itabashi city office (see the map of the conference center).
Please enjoy the breathtaking night view of Tokyo from the special location on Yakatabune, while

enjoying delicious cuisine cooked onboard.

2.11 Technical visit

Place: the Itabashi culture center
Time and Date: 9:00 - 14:00 in Nov. 10.
Visiting places: TOPCON corporation, RIKEN, Ohmori materials fabrication laboratory, Industrial exhibition of Itabashi City
After visiting the laboratories above, the tour bus will arrive to the Industrial Exhibition of Itabashi City at the gymnasium of East Itabashi. You can enjoy the lunchbox and join the exhibition. Fees for the visiting and your lunch are included in the conference registration fee. More informations are described in the final page of the digest book.

20th Itabashi industrial trade fair "2016 Manufacturing and processing "
at Higashi-Itabashi gymnasium

From 10:00 to 18:00 , on 10th and 11th November, 2016

Free of charge

3 For presenters

3.1 Oral presentation

For presentation: Please bring your own PC for presentation. Organizing committee will not prepare PC for presentation. Invited and general presentation consists of 30 and 15 mins, respectively. Presentation times are included for time of discussions coordinated by the session chair. In all presentation hall, a laser pointer is prepared.
For setting up: There is no extra PC to check your slide. Before your assigned session, you should check your slide by projection, especially for slides including movies.

3.2 Poster presentation

Display area and format: The poster session maximizes your opportunity for face-to-face discussion with symposium participants. The size of a poster is A0 size. Cellulose tape will be provided to hang your poster.
Setting up: Poster presenters must set up their posters between 15:15 and 15:30 on Nov. 8. Paper number will be posted on the poster boards in numerical order; please find your paper number and post your poster in the designated space.
Poster session: Poster session is between 15:30 and 16:30 on Nov. 8 at 4th floor of the Culture Hall. Presenter is required to stand by the poster during the scheduled poster session to answer questions from symposium attendees.

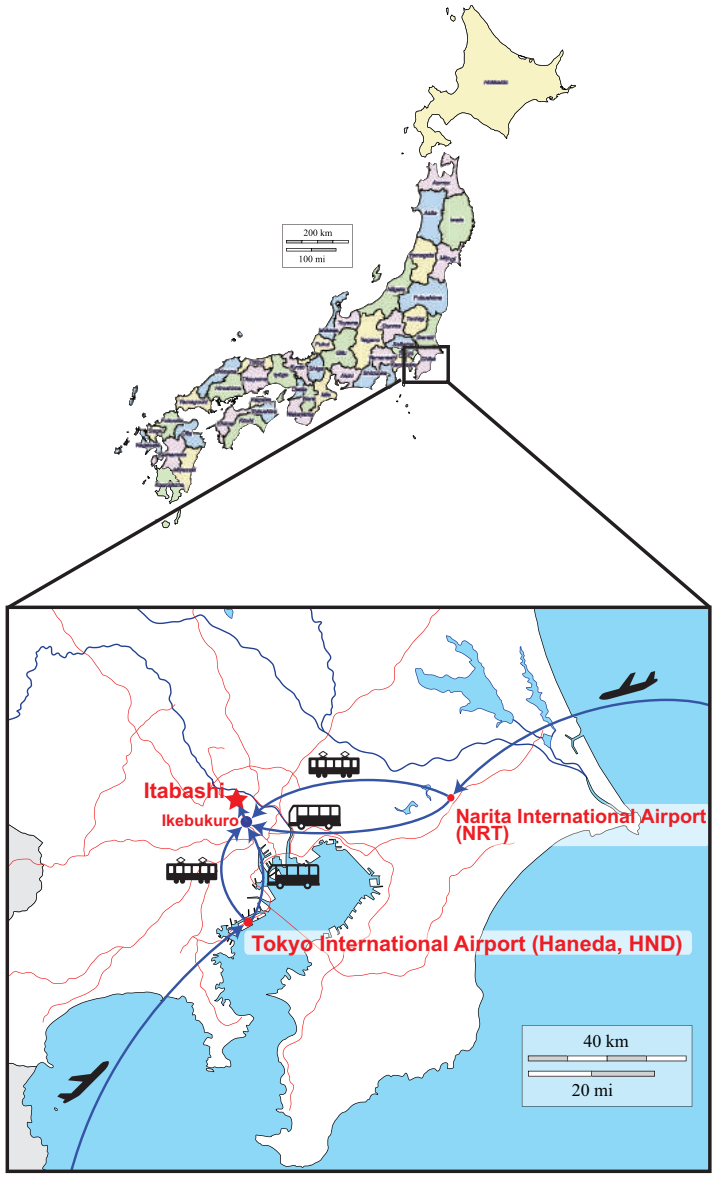
Access Map

From Narita International Airport (to JR Ikebukuro Station)

Board the JR Narita Express Train to JR Ikebukuro Station or the Airport Limousine Bus.

From Tokyo International Airport (to JR Ikebukuro Station)

Board Tokyo Monorail to Hamamatsu-cho Station, and connect to the JR Yamanote Line.



Map around the conference center

From JR Ikebukuro Station

Board Tobu-Tojo Line to Oyama Station. And 4-minutes walk to the conference site from the North Entrance of Oyama Station.

From Itabashikuyakushomae Station (subway)

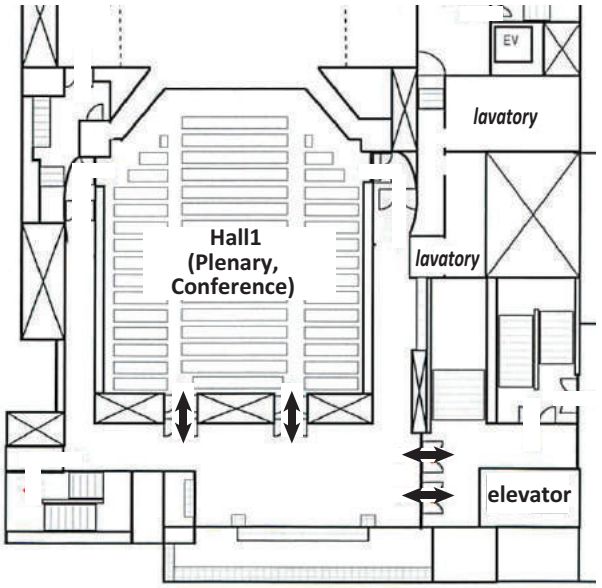
Board Toei subway, Mita line to Itabashikuyakushomae Station. And 10-minutes walk to the conference site from the A-3 entrance of Itabashikuyakusyomae Station.

The bus stop for the ISOT 2016 banquet

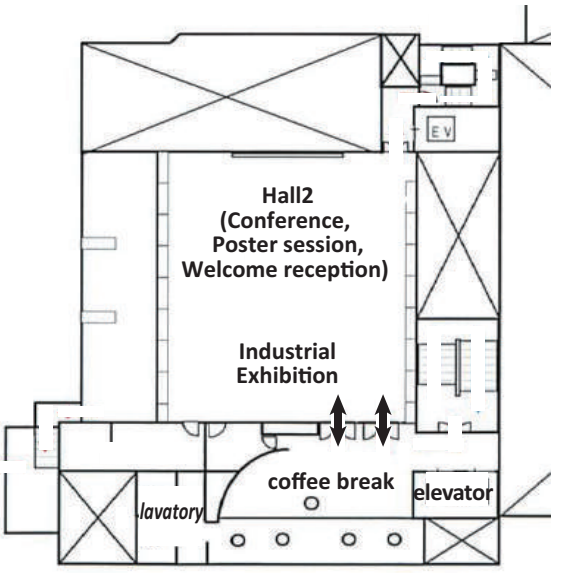
A special bus will be provided for going to ISOT2016 banquet and the bus stop is shown as a star mark on the map near the Itabashi city office.

Floor Guide

2nd floor: Hall 1: Opening, Plenary, Conference, Closing
4th floor: Hall2: Conference, Exhibition, Coffee break, Welcome reception
5th floor: Tea room: Tea ceremony, KABUTO (Samural helmet)



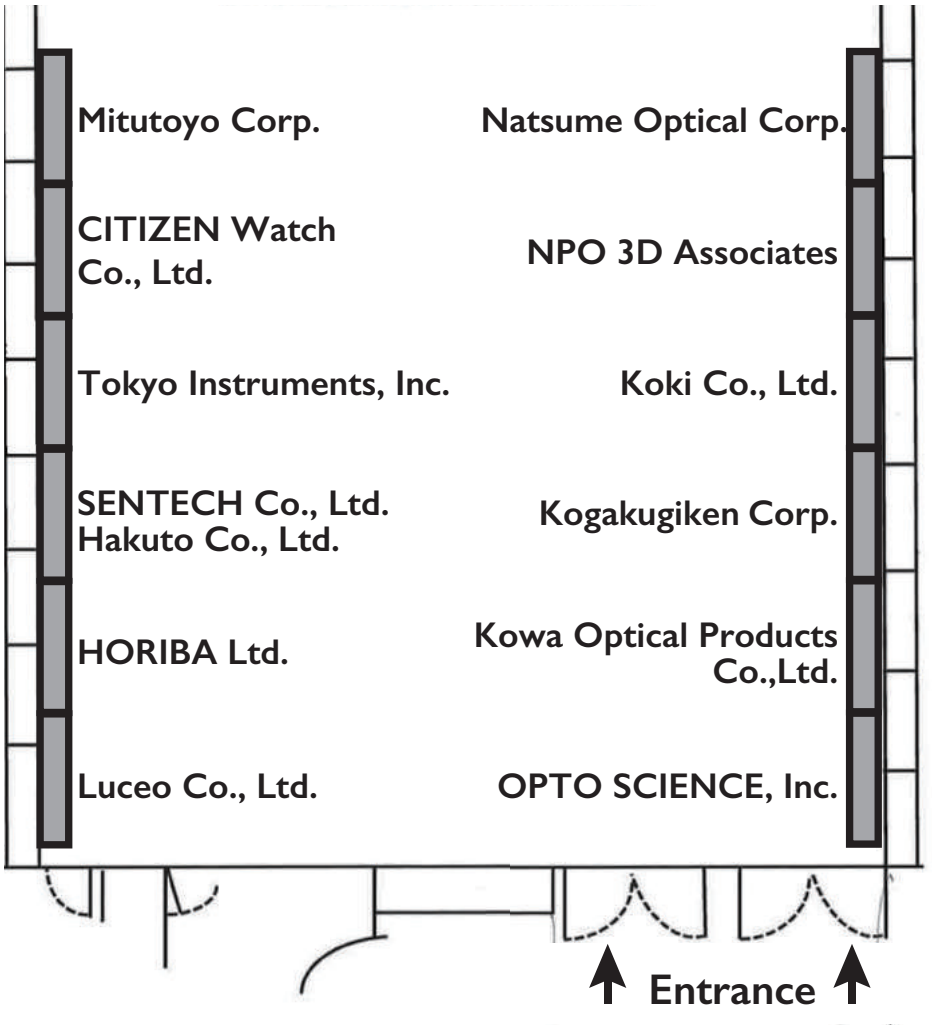
2nd floor



4th floor

Industrial Exhibition

Open industrial exhibition at Hall 2 from 10:00 (Day 1) to 15:00 (Day 3).



Conference schedule

Pre-conference (Nov. 6)		
17:30		Registration
18:00 - 20:30	**Get Together**	

Day 1 (Nov. 7)			
	Hall 1	Hall 2	
8:30			Registration
9:00 - 9:05	**Opening Ceremony (Hall 1)**		
9:05 - 10:15	**Plenary: Takeshi SAKAMOTO (Hall 1)**		
9:15 - 10:15	**Plenary: Jumpei TSUJIUCHI (Hall 1)**		
10:15 - 11:00	*Networking/Break* (Hall 2)		Exhibition
11:00 - 12:00	**Plenary: Hidetoshi KATORI (Hall 1)**		(Hall 2)
12:00 - 13:15	*Lunch* (RESTAURANT)		
13:15 - 14:45	**B-1**	**C-1**	
14:45 - 15:15	*Networking/Break* (Hall 2)		
15:15 - 16:30	**B-2**	**C-2**	
16:30 - 16:45			
17:00 - 18:00	**Photo & ISOM event (Hall 1)**		
18:00 - 20:00	**Welcome Reception (Hall 2)**		

B-1: Laser Processing and its Applications
B-2: Optomechanics for Robotics
C-1: Biomedical Applications
C-2: Optomechanical Sensor and Interferometry

Day 2 (Nov. 8)			
	Hall 1	Hall 2	
9:00			Registration
9:30 - 11:00	**B-3**	**C-3, SS1**	Exhibition
11:00 - 11:30	*Networking/Break* (Hall 2)		(Hall 2)
11:30 - 13:00	**B-4**	**SS1, C-4**	
13:00 - 14:00	*Lunch* (RESTAURANT)		
14:00 - 15:15	**B-5**	**C-5**	
15:15 - 15:30	*Networking/Break* (Hall 2)		
15:30 - 17:00	**Poster Session (Hall 2)**		
17:00 - 21:00	**ISOT 2016 Banquet (Yakata-bune)**		

B-3: Adaptive Optics
B-4: New Optomechatronic Technologies
B-5: Computational Imaging
C-3: Optical Trapping
C-4: Microscopy
C-5: Optical Sensors
SS1 (special session 1): Spectral Imaging

Conference Schedule

Day 3 (Nov. 9)				
	Hall 1	Hall 2		
9:00				Registration
9:30 - 11:00	**B-6**	**SS2**	Exhibition	
11:00 - 11:30	*Networking/Break* (Hall 2)		(Hall 2)	
11:30 - 13:00	**SS3**	**SS2**		
13:00 - 13:15				
13:15 - 13:45	*Lunch* (RESTAURANT)			
13:45 - 14:00	**SS3, SS4**			
14:15 - 15:15		**SS2**		
15:15 - 15:30	*Networking/Break*			
15:30 - 15:45	**SS4**	*Networking/Break*		
15:45 - 17:00		**SS2**		
17:00 - 17:30				
17:30	**Closing (Hall 1)**			

B-6: Optical Metrology

SS2 (special session 2): Polarization Technology

SS3 (special session 3): Optomechatronics in Biomedical Engineering Applications I

SS4 (special session 4): Optomechatronics in Biomedical Engineering Applications II

post-conference (Nov. 10)	
9:00	Start (meeting place: Itabashi Culture Hall)
9:30	**RIKEN, Ohmori Materials Fabrication Laboratory**
11:00	**TOPCON corporation**
12:30	Photo, Lunch at 20^{th} Itabashi Industrial Exhibision (venue of dismissal)

Detailed Program

Plenary 1: chair Yukitoshi Otani Day 1, Hall1, 9:05-9:15

Opening Address for ISOT2016, Itabashi, Tokyo

Takeshi SAKAMOTO

Mayor of Itabashi City

Plenary 2: chair Yukitoshi Otani Day 1, Hall1, 9:20-10:20

Holography in Mechanical Engineering

Jumpei TSUJIUCHI

Professor Emeritus, Tokyo Institute of Technology, Japan

Plenary 3: chair Yoshio Hayasaki Day 1, Hall1, 11:00-12:00

Optical Lattice Clocks: Seeking for a New Second

Hidetoshi KATORI

Professor, Department of Applied Physics, The University of Tokyo, Japan

Quantum Metrology Laboratory, RIKEN, Japan

Innovative Space-Time Project, ERATO, JST

DAY 1, MONDAY 7 NOVEMBER 2016 — Hall1

Laser processing and its applications

Session Chair: **Yoshio Hayasaki** (Utsunomiya Univ.)

13:15 **Mechanical properties of nanostructured polymer (invited)**
[B1-1] Satoru Shoji
The University of Electro-Communications

13:45 **Intermittent release of stress can form periodic surface holes on glass: subsurface**
[B1-2] **technique in femtosecond laser study**
Shigeki Matsuo[1], Shuichi Hashimoto[2]
1 Shibaura Institute of Technology, 2 The University of Tokushima

14:00 **Laser micro processing by position control of a photonic nanojet**
[B1-3] Tsutomu Uenohara, Yasuhiro Takaya, Yasuhiro Mizutani
Osaka University

14:15 **Versatile micro/nano-actuation scheme based on laser-induced modifications for**
[B1-4] **optomechanical devices**
Tao Yang, Yves Bellouard
Ecole Polytechnique Fe´de´rale de Lausanne (EPFL)

14:30 **Parallel femtosecond laser processing with more than 1000 beams**
[B1-5] Satoshi Hasegawa, Yoshio Hayasaki
Utsunomiya University

14:45 *Networking/Break/Exhibition at "Hall 2"*

Optomechanics for Robotics

Session Chair: **Kafman Jonathan** (Univ Waterloo.)

15:15 **FEA-based kinematics characterization of a soft robot for intracavitary navigationr**
[B2-1] **(invited)**
[B2-2] Kit-Hang Lee, Martin C.W. Leong, Marco C.K. Chow, Tim T.L. Lun, Hing-Choi Fu, Chim-Lee Cheung, Yexin Zhou, Kam-Yim Sze, Ka-Wai Kwok
The University of Hong Kong

15:45 **Geometric characterization of a hexapod-structured calibration device for multi-**
[B2-3] **component force and momentum transducers**
Jan Nitsche[1,2], Marcus Petz[1], Dirk Ro¨ske[2], Rolf Kumme[2], Rainer Tutsch[1]
1 TU Braunschweig, 2 Physikalisch-Technische Bundesanstalt (PTB)

16:00 **Demonstration of a 3D vibration measurement with a single-point laser doppler**
[B2-4] **vibrometer and a 6-axis industrial robot**
Thorben Ziemer, Christian Rembe
Clausthal University of Technology

16:15 **Real-time 3D profiling of the deposited material in pipes using laser optics technology**
[B2-5] Daniel Soto-Lo´pez[1], Mehran Mehrandezh[1], Farrokh Janabi-Sharifi[2]
1 University of Regina, 2 Ryerson University

DAY 1, MONDAY 7 NOVEMBER 2016	Hall1

Commemorative photo

ISOM event

Coordinator: Prof. Rainer Tutsch/ TU Braunschweig

17:00 **Greeting, introduction for the ISOM by the president**
Prof. Rainer Tutsch
TU Braunschweig

17:05 **History of ISOT**
Prof. Hyungsuck Cho
KAIST

17:15 **Japanese optomechatoronics association**
Prof. Jumpei Tsujiuchi
Prof. Emeritus, Tokyo Institute of Technology

17:30 **Optomechatorinics past present, and future**
Prof. Toru Yoshizawa
Prof. Emeritus, Tokyo University of Agriculture and Technology, NPO 3D association

17:40 **Panel discussion for ISOM by all speakers**

18:30 ***Welcome reception at "Hall 2"***

Biomedical applications

Session Chair: **Nathan Hagen** (Utsunomiya Univ.)

13:15 [C1-1] **Biomedical applications using near-infrared spectroscopy/imaging (invited)**
Jae Gwan Kim
Gwangju Institute of Science and Technology

13:45 [C1-2] **Artifact reduction method in endoscopic OCT catheter using double clad fiber (DCF)**
Min Woo Lee[1], Tae Shik Kim[2], Wang-Yuhl Oh[2], Hongki Yoo[1]
1 Hanyang University, 2 Korea Research Institute of Standards and Science

14:00 [C1-3] **Image denoising in optical coherence tomography based on iterative multi-layer perceptron**
Kyung-Chan Jin[1], Eun-Ju Lee[1], Kye-Sung Lee[2]
1 Korea Institute of Industrial Technology, 2 Korea Basic Science Institute

14:15 [C1-4] **Fully fiber based endoscopic micro-OCT**
Jun Young Kim[1], Jing Chao Xing[1], Min Woo Lee[1], Joon Woo Song[2], Jin Won Kim[2], Hongki Yoo[1]
1 Hanyang University, 2 Korea University Guro Hospital

14:30 [C1-5] **Reconstruction of accurate 3-D sharp edges using optical structured illumination imaging and data fusion**
Manh-Trung Le[1], Liang-Chia Chen[1,2], Chih-Jer Lin[1]
1 National Taipei University of Technology, 2 National Taiwan University

14:45 *Networking/Break/Exhibition at "Hall 2"*

Optomechanical sensor and interferometry

Session Chair: **Hongki Yoo** (Hanyang Univ.)

15:15 [C2-1] **In vivo intraocular pressure monitoring using implantable optomechanical sensor (invited)**
Jeong-Oen Lee[1], Haeri Park[1], Du Juan[2], Vinayak Narasimhan[1], Ashwin Balakrishna[1], Oliver Chen[1], David Sretavan[2], Hyuck Choo[1]
1 California Institute of Technology, 2 Ophthalmology

15:45 [C2-2] **High speed height measurement for micro bumps by linear scanning type confocal optical system**
Tatsuya Hinago[1,2], Mitsuhiro Ishihara[1]
1 TAKAOKA TOKO CO., LTD. 2 Utsunomiya University

16:00 [C2-3] **Improved back-focal-plane interferometry for monitoring nanoparticle position**
Shuzo Masui, Yousuke Horita, Masaki Michihata, Kiyoshi Takamasu, and Satoru Takahashi
The University of Tokyo

16:15 [C2-4] **Optical detection of fine particulate defects by autonomous searching liquid probe: theoretical design of high sensitive phase detection system**
Kazuki Tachibana, Shohei Asai, Masaki Michihata, Kiyoshi Takamasu, Satoru Takahashi
The University of Tokyo

16:30 [C2-5] **Deformation measurement of buckling phenomena using 3D-speckle interferometer**
Yasuhiko Arai
Kansai University

DAY1, MONDAY 7 NOVEMBER 2016	Hall2

Commemorative photo at Hall 1

ISOM event at Hall 1

Coordinator: Prof. Rainer Tutsch/ TU Braunschweig

17:00 **Greeting, introduction for the ISOM by the president**
Prof. Rainer Tutsch
TU Braunschweig

17:05 **History of ISOT**
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Prof. Toru Yoshizawa
Prof. Emeritus, Tokyo University of Agriculture and Technology, NPO 3D association

17:40 **Panel discussion for ISOM by all speakers**

18:30 ***Welcome reception at "Hall 2"***

DAY 2, TUESDAY 8 NOVEMBER 2016 — Hall1

09:00 ***Registration***

Adaptive optics

Session Chair: **Oliver B. Wright** (Hokkaido Univ.)

09:30 **Piezo actuated adaptive lenses (invited)**
[B3-1] U. Wallrabe[1], M. Stu¨rmer[1], R. Brunner[2], E. Fo¨rster[2], J.G. Korvink[3], M. Abdo[3],M. Zaitsev[4], F. Testud[4], F. Lemke[1], M.C. Wapler[1]
1 University of Freiburg, 2 Ernst Abbe University of Applied Sciences, 3 Institute for Microstructure Technology, 4 University Medical Center Freiburg

10:00 **Microscopy with adaptive lenses and multimode fibers (invited)**
[B3-2] Ju¨rgen W. Czarske, K. Philipp, D. Haufe, N. Koukourakis, L. Bu¨ttner
Technische Universita¨t Dresden

10:30 **Liquid crystal lens with circularly-patterned**
[B3-3] **highly-resistive-films**
Marenori Kawamura[1], Yuki Goto[1], Susumu Sato[2]
1 Akita University, 2 LC-Lens Institute

10:45 **Tunable optical encryption using a fluid phase mask**
[B3-4] David R. Schipf[1], Wei-Chih Wang[1,2]
1 University of Washington, 2 National Tsing Hua University

11:00 *Networking/Break/Exhibition at "Hall 2"*

New optomechatronic technologies

Session Chair: **Ulrike Wallrabe** (Univ. Freiburg)

11:30 **Optics and motion in nature (invited)**
[B4-1] R. Brunner[1,2]
1 Fraunhofer Institute for Applied Optics and Precision Engineering, 2 Ernst Abbe University of Applied Sciences

12:00 **Tracking GHz sound in nanostructures and cells**
[B4-2] O. B. Wright
Hokkaido University

12:15 **Determination of dimming levels in an RGBW mixed light source for AMOLED Inspection**
[B4-3] **using pattern search**
HyungTae Kim, SeungTaek Kim, Jongseok Kim, EungJoo Ha, JinHyeok Lee
KITECH

12:30 **Scanning electron microscope stereo image rectification for dense 3D reconstruction**
[B4-4] Andrey V. Kudryavtsev, Sounkalo Dembe´le´, Patrick Rougeot, Nadine Piat
University of Bourgogne-Franche-Comte´

12:45 **Development of 3-D shape measurement method using electron biprism**
[B4-5] Yoshiyuki Higashida, Yasuhiko Arai
Kansai University

13:00 *Lunch at "RESTAURANT Maki"*

DAY 2, TUESDAY 8 NOVEMBER 2016 — Hall1

Computational imaging

Session Chair: **Ryoichi Horisaki** (Osaka Univ.)

14:00 **Compressive phase retrieval (invited)**
[B5-1] George Barbastathis
Massachusetts Institute of Technology

14:30 **Simultaneous three-wavelength holographic motion-picture imaging by multi-wavelength**
[B5-2] **digital holography with dual reference arms**
Toru Kaku[1], Imari Sato[2,3], SangWook Lee[4], Takuro Ito[5], Osamu Iwata[6], Yasuhiko Arai[1], Yasuyuki Ozeki[4], Keisuke Goda[4,5], Tatsuki Tahara[1]
1 Kansai University, 2 National Institute of Informatics, 3 Tokyo Institute of Technology, 4 The University of Tokyo, 5 J apan Science and Technology Agency, 6 Euglena Co., Ltd.

14:45 **Movement and behavior analysis of biological samples using a near infrared imaging**
[B5-3] **system**
Geliztle A. Parra Escamilla, Masaru Matsuda, Masayuki Igo, Yukitoshi Otani
Utsunomiya University

15:00 **Profilometry using a complex-amplitude single-pixel camera**
[B5-4] Kazuki Ota, Yoshio Hayasaki
Utsunomiya University

15:15 *Networking/Break/Exhibition at "Hall 2"*

Hall 2

15:30 **Poster session**

17:00 ***Banquet on Yakata-bune***

DAY2, TUESDAY 8 NOVEMBER 2016 — Hall2

09:00 ***Registration***

Optical trapping & Spectral imaging 1

Session Chair: **Yasuhiro Mizutani (**Osaka Univ.)

09:30 **Optical micro-trapping using azimuthal walsh filters (invited)**
[C3-1] Indrani Bhattacharya[1], Lakshminarayan Hazra[2]
1 University of Engineering & Management,
2 University of Calcutta

***Special session 1*: Spectral imaging technology**
organizer: Ichiro Ishimaru/ *Kagawa University*

10:00 **Secrets of thermal imaging with uncooled cameras (invited)**
[SS1-1] Nathan Hagen
Utsunomiya University

10:30 **Holographic sensing based on random diffraction (invited)**
[SS1-2] Ryoichi Horisaki
Osaka University

11:00 *Networking/Break/Exhibition at "Hall 2"*

Spectral imaging 2 & microscopy

Session Chair**:Nathan Hagen** (Utsunomiya Univ.)

11:30 **Optimal merge number for hyperspectral imaging using bolometer camera and imaging**
[SS1-3] **interferometer (invited)**
Shigeru Sugawara[1], Mitsuhiro Yoshida[2], Tsubasa Saito[2], Yoshihiko Nakayama[3], Hideya Taniguchi[3], Ichiro Ishimaru[2]
1 National Research Institute of Police Science, 2 Kagawa University, 3 AOI ELECTRONICS Co. Ltd.

12:00 **Ultra-compact hyperspectral camera for mid-infrared lights (invited)**
Ichiro Ishimaru
[SS1-4] *Kagawa University*

12:30 **Color-coded LED microscopy: an effective platform for multi-contrast microscopy on a**
[C4-1] **mobile device (invited)**
Chulmin Joo
Yonsei University

13:00 *Lunch at "RESTAURANT Maki"*

Optical sensors

Session Chair: **Christian Rembe** (Tech. Univ. Clausthal)

14:00 **Fiber optical sensors - nerves made out of glass (invited)**
[C5-1] Wolfgang Schade, Martin Angelmahr, Christian Waltermann, Anna Lena Baumann
Fraunhofer HHI and Clausthal University of Technology

14:30 **3D minute form measurement by non-contact optical sensor**
[C5-2] Tatsuya Nagahama, Koichi Komatsu, Ryohei Kanno, Eisuke Moriuchi, Kouji Kubo
Mitutoyo Corporation

14:45 **Calibration of refractive index in microsphere diameter measurement based on analysis of**
[C5-3] **polarized whispering gallery mode**
Bohuai Chu, Masaki Michihata, Kohei Hayashi, Kiyoshi Takamasu, Satoru Takahashi
The University of Tokyo

15:00 **Optical water spray pressure sensor**
[C5-4] Wei-Chih Wang[1,2], Chun-Wei Wu[3]
1 National Tsing Hua University, 2 University of Washington, 3 National Cheng Kung University

15:15 *Networking/Break/Exhibition at "Hall 2"*

15:30 **Poster session**

17:00 ***Banquet on Yakata-bune***

DAY 3, WEDNESDAY 9 NOVEMBER 2016 — Hall1

09:00 ***Registration***

Optical metrology

Session Chair: **Wei-Chih Wang** (Univ. Washington.)

09:30 [B6-1] **Model based optical metrology in lithography --- inverse problem --- (invited)**
Hideki Ina
Canon Inc.

10:00 [B6-2] **Fizeau interferometer with phase-shifting and phase-scanning measurement modes**
Shyh-Tsong Lin, Ming-Shiang Wang
National Taipei University of Technology

10:15 [B6-3] **Temporal phase unwrapping in digital moire´**
Fatemeh Mohammadi, Jonathan Kofman
University of Waterloo

10:30 [B6-4] **Fabrication of morpho like structure using talbot effect**
Mitsuru Shinozaki, Yasuhiro Mizutani, Yasuhiro Takaya
Osaka University

10:45 [B6-5] **A tunable surface-plasmon-resonance substrate for in-process measurement of micro-stereolithography**
Deqing Kong, Masaki Michihata, Kiyoshi Takamasu, Satoru Takahashi
The Uniersity of Tokyo

11:00 *Networking/Break/Exhibition at "Hall 2"*

Special session 3: Optomechatronics in biomedical engineering applications I
organizer: Yeung Yam/*The Chinese University of Hong Kong*

Session Chair: **Yeung Yam** (Chinese Univ. Hong Kong)

11:30 [SS3-1] **Determination of single cell state using optically induced electric field in a microfluidic platform (invited)**
Yuliang Zhao, Wen J. Li
City University of Hong Kong

12:00 [SS3-2] **An advanced optical coordinate tracking system using wide-view afocal optics and curved image markers for image-guided surgery (invited)**
You Seong Chae[1], Hyun Ki Lee[2] and Min Young Kim[1]
1 Kyungpook National University, 2 Kohyoung Technology Ltd.

12:30 [SS3-3] **Cortical and muscular activities of general motions in upper limb rehabilitation using fNIRS and EMG (invited)**
SangHyeon Jin, SeungHyun Lee, SeonYun Jeong, and Jinung An
DaeguGyungbuk Institute of Science and technology

13:00 *Lunch at "RESTAURANT Maki"*

Session Chairs: **Yeung Yam** (Chinese Univ. Hong Kong)
& **Min Young Kim** (Kyungbuk National Univ.)

13:45 [SS3-4] **DMD-based high-speed axial scanning optical sectioning microscope with an electrically tunable lens (invited)**
D. P. Wang, Y. L. Meng, D. P. Zhang, C. L. Gu, S. C. Chen, Y. Yam
The Chinese University of Hong Kong

14:15 [SS3-5] **Direct laser writing of helical microswimmers with self-assembled magnetite nanoparticles coating for biomedical applications (invited)**
Mengzhi Li[1], Ben Wang[1], Dongdong Jin[1], Tianyun Huang[2], Huiling Duan[2], and Li Zhang[1]
1 The Chinese University of Hong Kong, Hong Kong, 2 Peking University

DAY 3, WEDNESDAY 9 NOVEMBER 2016	Hall1

***Special session 4*: Optomechatronics in biomedical engineering applications II**
organizer: Min Young Kim/*Kyungbuk National University*

14:45 [SS4-1] **Neuro-cortical hemodynamic pathway of pain by using functional near infrared spectroscopy (invited)**
Seung Hyun Lee, Sang Hyeon Jin, Gihyoun Lee, Jinung An
DaeguGyungbuk Institute of Science and technology

15:15 *Networking/Break*

Session Chair: **Min Young Kim** (Kyungbuk National Univ.)

15:30 [SS4-2] **Design of an MR-safe high-torque hydraulic stepper motor for MRI-guided robotic interventions (invited)**
Ziyan Guo, Ziyang Dong, Jacky H.C. Fu, Ka-Wai Kwok
University of Hong Kong

16:00 [SS4-3] **A sensor data fusion method based on kalman filter for surgical tracking system with optical tracker and internal vision sensor (invited)**
Hyun Min Oh, Young Jin Joe and Min Young Kim
Kyungpook National University

16:30 [SS4-4] **Toward FBG-based temperature independent force/torque sensor for cardiac ablation catheters (invited)**
Ata Taghipour, Farrokh Janabi-Sharifi
Ryerson University

17:00 [SS4-5] **DMD-based random-access scanning and its applications in two-photon microscopy(invited)**
Qiang Geng and Shih-Chi Chen
The Chinese University of Hong Kong

17:30 **Closing**

DAY3, WEDNESDAY 9 NOVEMBER 2016 Hall2

09:00 ***Registration***

***Special session* 2: Polarization technology**
organizer: Yukitoshi Otani/ *Utsunomiya University*

Session Chair: **Yukitoshi Otani** (Utsunomiya Univ.)

09:30 [SS2-1] **Measuring glucose concentration with scattering effect using stokes-mueller polarimetry (invited)**
Yu-Lung Lo, Jian-Xiang Lin, Quoc-Hung Phan
National Cheng Kung University

10:00 [SS2-2] **Surface anisotropy of rubbed PI and distribution of LC molecules in TN cell characterized by using ellipsometry (invited)**
Sung Yong Cho[1], Sang Uk Park[2], Sang Youl KIM[1,2]
1 Ajou University, 2 Ellipso Technology Co., Ltd.

10:30 [SS2-3] **Generation of broadband optical vortex and ring-shaped optical-lattice using axially symmetric polarization elements (invited)**
K. Oka[1], M. Sakamoto[1,2], K. Yamane[1], N. Murakami[1], R. Morita[1]
1 Hokkaido University, 2 Nagaoka University of Technology

11:00 *Networking/Break/Exhibition at "Hall 2"*

Session Chair: **Daesuk Kim** (Chonbuk National University)

11:30 [SS2-4] **Ghost imaging ellipsometry (invited)**
Yasuhiro Mizutani[1], Yasuhiro Takaya[1], Yukitoshi Otani[2]
1 Osaka University, 2 Utsunomiya University

12:00 [SS2-5] **Principles and application of spectroscopic ellipsometry (invited)**
Takumi Moriyama[1], Nataliya Nabatova-Gabain[2]
1 HORIBA TECHNO SERVICE Co., Ltd, 2 HORIBA Ltd.

12:30 [SS2-6] **Full polarimetric diagnosis of 193-nm immersion lithography equipment using a mask with thin plate polarizers and wide-view-angle λ/4 plates**
Hiroshi Nomura
Toshiba Corporation

12:45 [SS2-7] **Observation of sample with the simplified mode birefringence optical microscope**
Shinya Ohkubo
National Institute of Technology, Numazu College

13:00 [SS2-8] **Development of spectroscopic stokes and mueller polarimeter**
Ryutaro Shimada
Tokyo Instruments, Inc.

13:15 *Lunch at "RESTAURANT Maki"*

DAY3, WEDNESDAY 9 NOVEMBER 2016	Hall2

Session Chair: **Kazuhiko Oka** (Hokkaido Univ.)

14:00 [SS2-9] **Extraction method of polarization properties of the individual components of a layered system and its application (invited)**
Lianhua Jin
University of Yamanashi

14:30 [SS2-10] **Dynamic spectroscopic ellipsometry: theory and applications (invited)**
Daesuk Kim, Vamara Dembele, Inho Choi, Ramachandran Kasu
Chonbuk National University

15:00 [SS2-11] **Laser diode interferometer utilizing polarization technique (invited)**
Takamasa Suzuki, Samuel Choi, Osami Sasaki
Niigata University

15:30 *Networking/Break*

Session Chair: **Yasuhiro Mizutani** (Osaka Univ.)

15:45 [SS2-12] **Spectroscopic ellipsometry – a versatile tool for sophisticated applications (invited)**
S. Peters
SENTECH Instruments GmbH

16:15 [SS2-13] **Decomposition of partial mueller matrix to simultaneously measure birefringence and depolarization characteristics in real time**
Pradipta Mukherjee, Yukitoshi Otani
Utsunomiya University

16:30 [SS2-14] **Single shot mueller matrix polarimetry using axially symmetric quarter wave plate and channelled spectrum**
Kaustav Bhattacharyya[1], Toshitaka Wakayama[2], Nathan Hagen1, Yukitoshi Otani[1]
1 Utsunomiya University,2 Saitama Medical University

16:45 [SS2-15] **A partial mueller matrix polarimeter using two photoelastic modulator and polarizer pairs**
Nia Natasha Tipol[1], Shuichi Kawabata[2], Yukitoshi Otani[1]
1 Utsunomiya University, 2 Tokyo Polytechnic University

17:30 **Closing at Hall1**

Poster session		Day 2, Hall 2, 15:30-16:00
#	title, authors, affiriation	
P01	**Uncertainty in length conversion for length measurement using a comb laser interferometer** Dong Wei, Masato Aketagawa *Nagaoka University of Technology*	
P02	**Femtosecond laser processing of transparent materials using a diffractive nonparabolic lens** Cao Hoai Vu, Satoshi Hasegawa, Yoshio Hayasaki *Utsunomiya University*	
P03	**Co-occurrence pixel block pairs background subtraction for object detection in dynamic scene** Wenjun Zhou[1], Shun ' ichi Kaneko[1], Dong Liang[2], Manabu Hashimoto[3], Yutaka Satoh[4] *1 Hokkaido University, 2 Nanjing University of Aeronautics and Astronautics, 3 Chukyo University, 4 National Institute of Advanced Industrial Science and Technology*	
P04	**High power quasi-cw Yb all-fiberized laser with ∼5.76 kW peak power** Minjee Jeon[1,2], Yeji Jeong[1,2], H.S. Seo[3], J. W. Kim[2], Hoon Jeong[1] *1Korea Institute of Industrial Technology, 2 Hanyang University ERICA, 3 Electronics and Telecommunications Research Institute (ETRI)*	
P05	**Development of optical actuator ∼Fabrication of micro rotor∼** Hiroki Takeda, Yasuhiko Arai *Kansai University*	
P06	**Vision-based measurement of coke granularity** Terry Yuan-Fang Chen[1], Chun-Hung Wu[1], Der-Her Wang[2] *1 National Cheng Kung University, 2 China Steel Corporation*	
P07	**A Novel rotary liquid lens for laser beam shaping** Chao-Ching Ho[1], Yuan-Jen Chang[2], Jin-Chen Hsu[2], Chia-Lung Kuo[2], Hao-Jen Chen[2] *1 National Taipei University of Technology, 2 National Yunlin University of Science and Technology*	
P08	**In-line total inspection of burr and dimension** Hiroki Tokunaga[1], Takanori Yazawa[1], Atsuhiro Koyama[1], Reiko Yamada[1], Xin Yuan[1], Tetsuya Matsumoto[1], Yuya Miyamoto[1], Tatsuki Otsubo[2], Kazuhisa Hamazono[3], Yukihiro Matsuo[4] *1 Nagasaki University, 2 Salesian Polytechnic University, 3 Toshiba Machine Co. Ltd., 4 Panasonic Corp.*	
P09	**Highly efficient second harmonic generation of high-power Yb fiber lasers using MgO:PPSLT** Eun-Ji Park[1], Hoon Jeong[2], J. W. Kim[1] *1 Hanyang University ERICA, 2 Korea Institute of Industrial Technology*	
P10	**High-efficiency Yb fiber lasers tandem-pumped by a tunable Yb fiber laser** YeJi Jung[1,2], M. J. Jeon[1,2], H. Jeong[2], J. W. Kim[1] *1 Hanyang University ERICA, 2 Korea Institute of Industrial Technology*	
P11	**Design and implementation of a 2D LiDAR for intelligent transportation systems** Junhwan Jang, Sungui Hwang, Bumsik Won, Yagyeol Seo, Kyihwan Park *Gwangju Institute of Science and Technology*	
P12	**Implementation of adaptive coded aperture imaging using a digital micro-mirror device for defocus deblurring** Ashill Chiranjan, Bernardt Duvenhage *Defence, Peace, Safety and Security Council for Scientific and Industrial Research Pretoria*	
P13	**Visual servoing technique for modal analysis of a rotating object** Dongkyu Kim, Hossam Khalil, Youngjoon Jo, Kyihwan Park *Gwangju institure of Science and Technology*	
P14	**Phase sensitive CT measurement using a pixelated polarizing shearing interferometer** David I. Serrano-Garcia, Yukitoshi Otani *Utsunomiya University*	
P15	**Laser joining of engineering plastic polycarbonate and A5052 aluminum alloy using insert materials** Ryoichi kuwano[1], Makoto Hino[1], Norihito Nagata[2], Kazuya Nagata[3], Tsuyoshi Tokunaga[4], Sho Morita[4], Mizue Ebisawa[5] *1 Hiroshima Institute of Technology, 2 Surtech Nagata Co.,Ltd., 3 Toyama Prefectural University, 4 Chiba Institute of Technology, 5 Tokyo Metropolitan Industrial Technology Research Institute*	
P16	**High-resolution frequency scanning interferometry with a linearly chirped vertical-cavity surface-emitting laser Diode** Seiichi Kakuma *Hokkaido University*	
P17	**Study on chipping inspection of cutting knife using spatial filtering** Takanori Yazawa[1], Yuya Miyamoto[1], Tetsuya Matsumoto[1], Hiroki Tokunaga[1], Tatsuki Otsubo[2], Megumu Kuroiwa[3] *1 Nagasaki University, 2 Salesian Polytechnic univerisity, 3 EM Laboratory Co.*	
P18	**Development of rotor with optical actuator using the silicon-fabrication process** Dai SHIMIZU and Yasuhiko ARAI *Kansai University*	

The ISOT 2016 "Yakatabune" Banquet

[Message from Traditional Japanese-style cruising restaurant "HARUMIYA"]

Yakatabune, one of the traditional Japanese boats equipped with a variety of facilities, allows you to enjoy the banquet or dinner on the boat. It was originated during the Heian Period as a form of entertainment for the aristocracy. Yakatabune flourished during the Edo Period to be preferably used for cherry-blossom viewing, the moon-viewing party and fireworks festivals. Harumiya, a historical company established in 1901, is currently welcoming the customers with a unique hospitality with the historic atmosphere and operating Yakatabune cruising mainly around Tokyo/Odaiba area covering the major landmarks such as Tokyo Skytree, Tokyo Tower, Rainbow Bridge and Tsukiji Fish Market in a leisurely way.

While enjoying the astonishing view of Tokyo Bay and comfortable ocean breeze, you can experience the memorable time in Tokyo. It is recommend for families or couples to spend the relaxing time together on the boat or it can be used for party/event with your business partners or intimate friends.

Boats offer made from seasonal and fresh ingredients of the best quality. Please try the authentic Japanese cuisines led by fresh Sashimi directly from Tsukiji Fish Market and Tempura served still being hot.

We hope you would be satisfied with the luxury time feeling the elegance of Tokyo Bay.

Place: Asashio Boat pier, 3-1-1 Harumi, chuo-ku. (5 minutes from Exit A3 of Kachidoki Station on the Toei Oedo line.)
Time and Date: 18:00 - 21:00 in Nov.8.
Bus pickup: 17:10 near the place of Itabashi city office (*see p.14 "the map of the conference center"*). Regular fee is included banquet fee. Student fee is NOT included banquet fee. Accompanying person can join all events except for scientific sessions.

Spectroscopic Ellipsometer for non-destractive thin film and bulk material characterization.

非接触・非破壊による高度な薄膜解析装置 分光エリプソメーター

J.A.Woollam Japan Corporation focused on Spectroscopic Ellipsometer, which measures very thin film and bulk materials by non-contact and un-destroyed. It allows advanced measurement and analysis technology. (Anisotropic materials, Depolarization, Mueller-Matrix)

分光エリプソメーターは偏光解析法により、試料の膜厚および光学定数の波長分散を求める装置です。高度な測定解析が可能です。
（異方性物質解析・偏光解消・ミューラー行列など）

＜Measurement analysis items＞ 測定解析項目

- Optical Constants n, k 光学定数（屈折率：n, 消衰係数：k）
- Thickness 薄膜の膜厚
- The information of chemical bond 分子種などの化学結合情報
- Mixing ratio of film component 膜構成物質の混合比
- Surface layer, Interface layer 表面層、界面層
- Anisotropy 異方性

Next-generation ellipsometer - M-2000 series - 次世代のエリプソメーター M-2000シリーズ

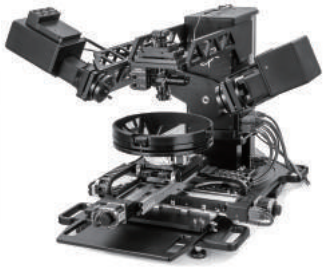
Ex-Situ, In-Situ, many spectral ranges available from 193 to 1700.

The M-2000 collect over 700 wavelength from the ultraviolet to the near infrared - all simultaneously. This device analyze spectrum data in real time, and can feed back the film information to the coating system.

数百の波長を同時に、しかもエリプソメトリーパラメータ（Ψ・⊿）のフルレンジを測定します。分光データをリアルタイムで解析し、膜情報を成膜装置へフィードバックできます。

Automated Angle
自動多入射角装置

Mueller-matrix SE
ミューラー行列エリプソメトリー



In-Situ
成膜装置取付 in-situ測定

Wide spectral range - 145nm to 33 microns - VASE series -

VUV真空紫外（145nm）からIR赤外域（33μm）まで測定可能な装置　自動多入射角分光エリプソメーター　VASEシリーズ

Variable wavelength and angle of incidence allow flexible measurement capabilities.
複数入射角で広範な波長域の分光データを同時に解析することで、薄膜の様々な情報を得ることができます。

VUV-VASE
真空紫外域多入射角分光エリプソメーター
(真空紫外ー近赤外域測定)

VASE
多入射角分光エリプソメーター
(紫外ー近赤外域測定)

IR-VASE MarkII
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(赤外域測定)

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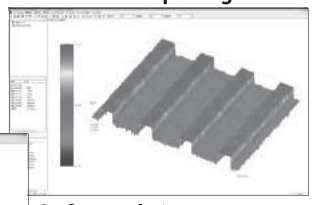
Mitutoyo Quality

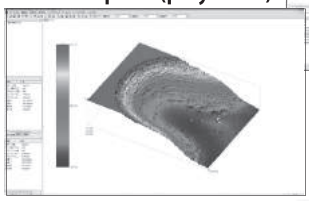
High accuracy hybrid measurement is achieved with the WLI optical head

Semiconductor package substrate



Surface analysis

Electrical parts (polyimide)



Surface analysis, step and cross-section measurement

WLI White Light Interferometer

- White light interferometer (WLI optical head) enables Non-contact 3D measurement with high precision and high resolution
- Seamlessly continuous 3D measurement is made possible by the Vision optical head and the WLI optical head measurement
- Advanced-design platform culminating from Mitutoyo's high accuracy technology

Main specifications

Model		Hyper QVWLI 302	Hyper QVWLI 404	Hyper QVWLI 606
Measuring range (X×Y×Z)	Vision optical head	300×200×190 mm	400×400×240 mm	600×650×220 mm
	WLI optical head	215×200×190 mm	315×400×240 mm	515×650×220 mm
Resolution		0.01 µm		

NEW-STYLE
Vision Measuring Systems

Non-contact 3D Measuring System

Hyper Quick Vision WLI Series

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NATSUME
OPTICAL CORP.
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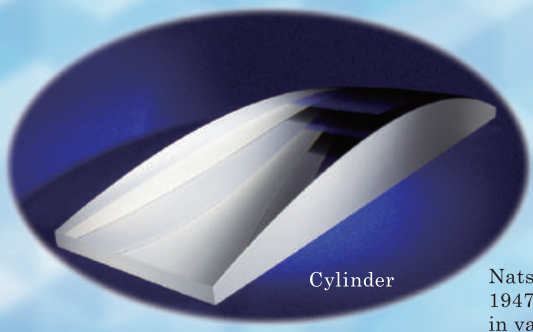
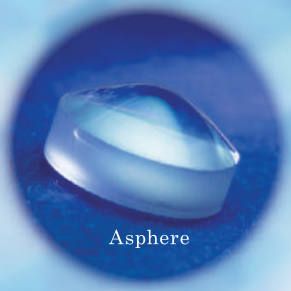


Natsume Optical Corporation (NOC), founded in 1947, is an optical device manufacturer specializing in various kinds of high precision optical products. With more than 60 years' experience, NOC has developed sophisticated optical technology to meet any customer requirement.

Market:
Laser, Litho, Telecommunication,
Medical, Astronomy, Spectoscopy



Customized lens:
Asphere, Precision spherical lens
Cylindrical lens, Aspherical cylindrical lens
Axicon lens, Prism
Freeform, Troid
Ball lens, Mirror

Capabilities
Size: 0.5 - 400 mm
Figure error < PVr λ/40 in C.A.
Waviness < RMS 2 nm in MSFR
Micro roughness < RMS 0.2 nm in micro region

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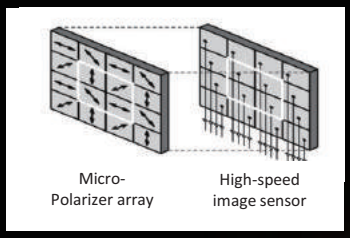

High-speed Polarization Image Sensor

PI-1 Series

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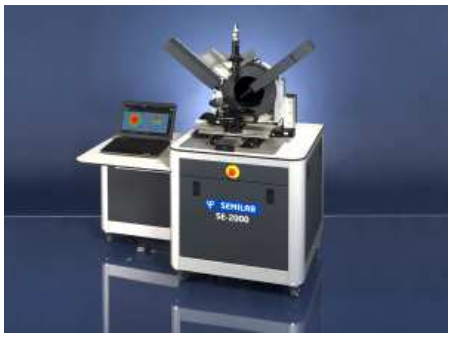
薄膜解析装置　分光エリプソメーター

グラフェン、有機薄膜などの膜厚・光学特性（屈折率・消衰係数）を非接触測定

薄膜、多層膜の膜厚、及び屈折率(nk値)波長スペクトルを算出します。回転補償子型分光エリプソメーターにPMT やCCD等のディテクターを搭載できるなど、用途に応じて様々な分光エリプソメトリーの組み合わせが可能です。



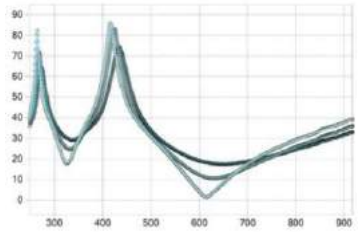
分光エリプソメータ　SE-2000

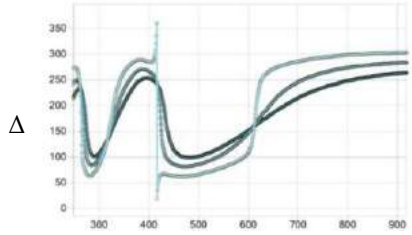
サブ・ナノメートル　薄膜測定

有機薄膜　膜厚・屈折率　測定

最先端　回転補償子型 分光エリプソメータによる高精度測定

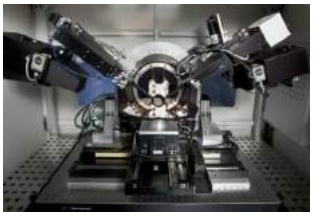
回転補償子型分光エリプソメータによりフルレンジのψ、Δを測定し、多様な光学モデルと最先端の解析アルゴリズムを搭載した解析ソフトウエアにより高精度な解析結果を導き出します。





真空紫外から赤外領域まで　多様なアプリケーションに対応

赤外分光エリプソ　IRSE



真空紫外分光エリプソ　PUV

In Situ装置　RTSE

非接触シート抵抗／ラマン分光／反射率／透過率／マッピング・サンプルステージ／
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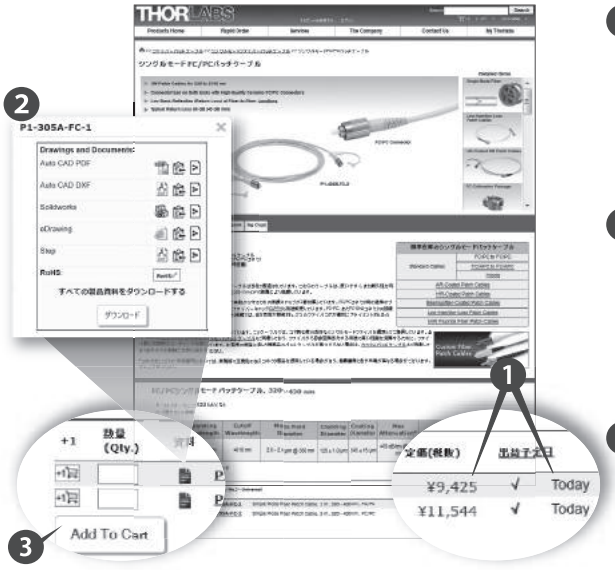

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