

## Report on OPTICS & PHOTONICS International Congress 2016 (OPIC2016)

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### 1. Introduction

OPTICS & PHOTONICS International Congress (OPIC) has been held annually since 2012 at Yokohama as an international forum to present and discuss the most up-dated R & D activities in optics and photonics over the world. The state-of-art technologies and products in optics and photonics are exhibited at the co-located and jointly organized OPIE (OPTICS & PHOTONICS International Exhibition).

OPIC2016 was held during May 17-20, 2016 at Pacifico Yokohama Congress Center with Congress Co-Chairs: Kenichi Iga (Tokyo Institute of Technology, Japan), Andreas Ostendorf (Ruhr-University Bochum, Germany) and Christopher P. J. Barty (Lawrence Livermore National Laboratory, USA) (Fig. 1). OPIC2016 was organized by OPTICS and PHOTONICS International Council, with the support of five Ministries of Japanese Government and Japan Business Foundation, and in cooperation with many research institutes and academic societies in Japan and foreign countries, as shown in Table 1.

OPIC is composed of Specialized International Conferences covering broad-ranged fields in optics and photonics. One of the unique features of OPIC is that each conference is “hand-made”, i.e. each Specialized International Conference is planned and operated by the Conference Chair and his consortium of scientists, based on their own initiatives to strengthen and advance the research and network in each specific field. This approach helps Conference Chairs to organize attractive conferences with timely topics and up-dated speakers, and



Fig. 1 Congress Co-Chairs of OPIC2016: Kenichi Iga, Andreas Ostendorf, and Christopher P. J. Barty (from left to right).

Table 1 Organization of OPIC2016.

**OPTICS & PHOTONICS International Congress 2016 (OPIC2016)**  
Co-located with OPTICS & PHOTONICS International Exhibition 2016 (OPIE2016)  
Organized by OPTICS & PHOTONICS International Council

#### Specialized International Conferences were Organized by

The Laser Society of Japan / The Japan Society of Applied Physics / Institute of Laser Engineering, Osaka University / Akasaki Research Center (ARC), Nagoya University / Japan Laser Processing Society / The Micro Solid-State Photonics Group of The Laser Society of Japan / The Executive Committee of Laser Solution for Space and the Earth / RIKEN SPring-8 Center / Research Center for Ultra-Precision Science & Technology, Osaka University.

#### Supporting agencies for OPIC2016

Ministry of Education, Culture, Sports, Science and Technology (MEXT) / Ministry of Economy, Trade and Industry (METI) / Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) / Ministry of Health, Labour and Welfare (MHLW) / Ministry of Land, Infrastructure, Transport and Tourism (MLIT) / Keidanren (Japan Business Federation).

#### Cooperating agencies for OPIC2016

The National Institute of Advanced Industrial Science and Technology (AIST) / New Energy and Industrial Technology Development Organization (NEDO) / Japan Science and Technology Agency (JST) / The Japan Atomic Energy Agency (JAEA) / RIKEN / Atomic Energy Society of Japan (AESJ) / The Japan Society of Plasma Science and Nuclear Fusion Research (JSPF) / The Optical Society of Japan / Optoelectronic Industry and Technology Development Association (OITDA) / Institute for Laser Technology (ILT) / Japan Photonics Council (JPC) / SPIE (USA) / OSA (USA) / Landesmesse Stuttgart GmbH (Germany) / PIDA (Taiwan) / KAPID (Korea) / Photonics Media (USA).

also to broaden the research networks by continuing to hold the conferences over several years.

### 2. OPIC2016 with record high participants

OPIC2016 was composed of 11 Specialized International Conferences, the largest number since the beginning of OPIC, owing to joining of 2 new Conferences: Laser Solution for Space and the Earth (LSSE) and International Conference on X-ray Optics, Detectors, Sources, and Their Applications (XOPT). These 11 Specialized International Conferences and the Conference Chairs are shown below.

- The 5th Advanced Lasers and Photon Sources (ALPS'16)  
Chair: H. Yoneda (The University of Electro-Communications)
- Biomedical Imaging and Sensing Conference 2016 (BISC'16)  
Chair: T. Yatagai (Utsunomiya University)
- Conference on Laser Energy Science (CLES 2016)  
Chair: H. Azechi (Osaka University)
- International Conference on High Energy Density Science 2016 (HEDS2016)  
Chair: R. Kodama (Osaka University)
- The 4th International Conference on Light-Emitting Devices and Their Industrial Applications (LEDIA'16)  
Chair: H. Amano (Nagoya University)
- The 4th Laser Ignition Conference 2016 (LIC'16)  
Chair: T. Taira (Institute for Molecular Science)
- Laser Solution for Space and the Earth (LSSE2016)  
Chair: T. Ebisuzaki (RIKEN)
- The 3rd Optical Manipulation Conference (OMC'16)  
Chair: T. Omatsu (Chiba University)
- The 5th Pacific-rim Laser Damage Conference (PLD'16)  
Chairs: T. Jitsuno (Osaka University), Jianda Shao (SIOM) and W. Rudolph (University of New Mexico)
- The 2nd Smart Laser Processing Conference (SLPC2016)  
Chairs: Y. Okamoto (Okayama University) and R. Poprawe (Fraunhofer ILT)
- International Conference on X-ray Optics, Detectors, Sources, and their Applications 2016 (XOPT'16)  
Chairs: T. Ishikawa(RIKEN) and K. Yamauchi(Osaka University)

The overall schedule of OPIC2016 is shown in Fig. 2. The Specialized International Conferences were held in parallel during May 17-20, with exception of Joint Sessions in the afternoon of May 18. The Posters were presented at the Exhibition Hall in order to stimulate interaction between OPIC and OPIE participants. The OPIC Plenary Session, open to public, and OPIC Reception were held in the morning and evening of

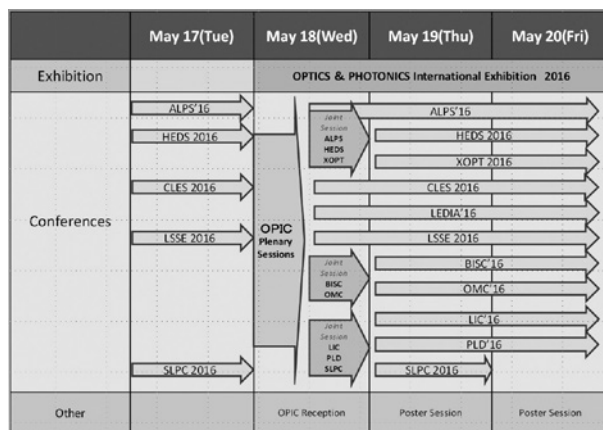


Fig. 2 Overall schedule of OPIC2016.

May 18, respectively.

Records of OPIC and Specialized International Conferences during 2012-2016 are summarized in Table 2. Some of the Specialized Conferences have been organized with different titles by the same or related communities and some Conferences were held at other countries for convenience to participants, as shown in italics in Table 2.

Table 2 shows that OPIC has been growing steadily as seen, for example, from the number of participants and the number of participants per conference. Accelerating this trend, OPIC2016 was held with record high numbers in specialized conferences (11), papers presented (737), participants (1028), fraction of foreign participants (32 %), and participating countries (31). The top 10 countries, in order of the number of participants (shown in parentheses), are Japan (700), China (67), USA (50), Taiwan (48), Korea (37), Germany (27), France (25), UK (18), Russia (11) and Australia (6). (Here "country" refers to the place where participant's affiliation is located.) These statistics show that OPIC is becoming an international forum with broad scientific scopes, attended by well-balanced international communities in Asia, north America, Europe and Russia. Some of the Specialized Conferences that have been held continuously over several years are now firm-footed with repeated attendance of many participants who are looking forward to discussing the most-updated progress of their fields at OPIC.

The co-located OPIE2016, composed of 7 Exhibitions, was held during May 18-20 by participation of 335 companies and organizations, including direct overseas exhibitions by 8 countries and 44 companies. Total number of the participants to OPIE2016 over 3 days was 15,132. Various activities were organized during OPIE including technical exhibitions, product demonstrations, and technical seminars. Also the Award Ceremony of the 2016 Industrial Award by The Laser Society of Japan was held at the Exhibition Hall, and awards were presented in 3 categories to 7 companies.

### 3. OPIC2016 Plenary and Reception

OPIC Plenary Session was held in the morning of May 18. At the beginning of this Session, A. Ostendorf, Congress Chair, has expressed condolence to Professor Wolfgang Sandner for his sudden passing away on December 5, 2015. Prof. Sandner, Director General of ELI DC, was scheduled to present a plenary talk at OPIC2016. Welcome to OPIC2016 was given by Sadao Nakai and Reinhart Poprawe, representing the International Advisory Board.

Four plenary talks by excellent speakers were presented at this Plenary Session (Fig. 3). Mitsuru Sugawara, President of QD Laser, Inc., presented the first talk titled "Retinal Imaging Laser Eyewear: From Low Vision Aids to Smart Glass". Retinal imaging is a new scheme of a smart glass, where retina is used as a screen of a miniature projector with the RGB quan-

Table 2 Records of OPIC and Specialized International Conferences during 2012-2016. (Specialized International Conferences held previously and at other countries are shown in italics.)

Year	OPIC2012	OPIC2013	OPIC2014	OPIC2015	OPIC2016
Date	April 25-27	April 23-26	April 22-25	April 22-24	May 17-20
Congress Chairs	K. Shimoda R. Byer	K. Shimoda R. Byer	K. Iga R. Byer A. Ostendorf	K. Iga C. Barty A. Ostendorf	K. Iga C. Barty A. Ostendorf
Number of Specialized Conferences	6	10	9	7	11
Papers presented	296	411	570	478	736
Participants	519	677	782	732	1028
Foreign participants (%)	24%	18%	27%	25%	32%
Participants / Conference	86.5	67.7	86.9	104.6	93.5
Number of Countries	23	23	28	26	31
<b>Specialized International Conferences</b>	Conf. Chair	Conf. Chair	Conf. Chair	Conf. Chair	Conf. Chair
ALPS (Advanced Lasers and Photon Sources)	K. Midorikawa	K. Midorikawa	F. Kannari	N. Miyanaga	H. Yoneda
<i>SeTBio (Sens. Tech. for Biomater., Food, &amp; Agri.)</i>		<i>N. Kondo</i>			
BISC (Biomedical Imaging & Sensing Conf.)			T. Yatagai		T. Yatagai
<i>APBP (Asian &amp; Pacific-Rim Symp. Biophoton.)</i>				<i>T. Iwai</i>	
<i>CIFE (Conf. on Inertial Fusion Energy)</i>	<i>H. Azechi</i>				
<i>LANSa (Laser &amp; Accler. Neutron Sourc. &amp; Appli.)</i>		<i>H. Azechi</i>			
<i>LSC (Laser &amp; Synch. Rad. Combin. Exper.)</i>			<i>H. Azechi</i>		
<i>CLE (Conf. on Laser Energetics)</i>				<i>H. Azechi</i>	
CLES (Conf. on Laser Energy Science)					H. Azechi
HEDS (Int. Conf. on High Energy Density Sci.)	R. Kodama	R. Kodama	R. Kodama	R. Kodama	R. Kodama
LEDIA (Conf. on LED & Its Indust. Appl.)		H. Amano	H. Amano	H. Amano	H. Amano
LIC (Laser Ignition Conf.)		T. Taira	T. Taira	<i>(in US)</i>	T. Taira
<i>LANE (Laser Appl. on Nuclear Engin.)</i>		<i>H. Horiike</i>			
LSSE (Laser Solution for Space & the Earth)					T. Ebisuzaki
OMC (Optical Manipulation Conf.)			T. Omatsu	T. Omatsu	T. Omatsu
PLD (Int. Conf. on Pacific-Rim Laser Damage)			T. Jitsuno	<i>(in China)</i>	T. Jitsuno, J. Shao, W. Rudolph
<i>LPCC (Laser Proc. for CFRP &amp; Compos. Mater.)</i>	M. Kutsuna	<i>H. Ogata</i>			
SLPC (Smart Laser Process. Conf.)			Y. Okamoto		Y. Okamoto, R. Poprawe
XOPT (Int. Conf. X-ray Opt., Det., Sourc. & Appl.)					T. Ishikawa, K. Yamauchi

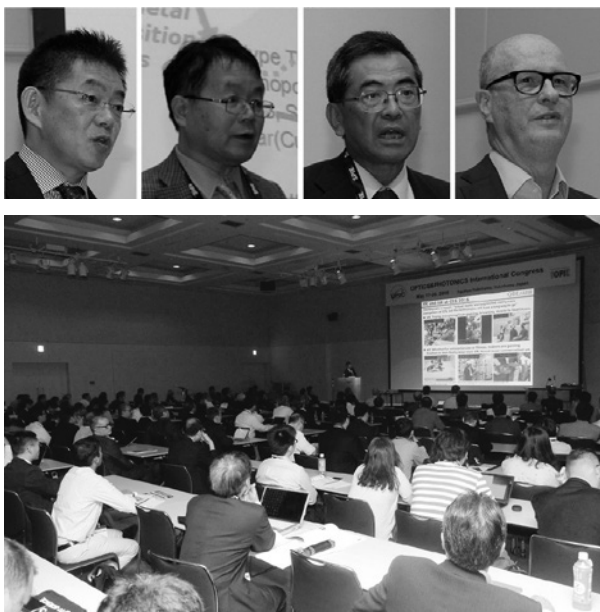


Fig. 3 Plenary speakers of OPIC2016: Mitsuru Sugawara, Hideo Hosono, Masanori Iye and Georg Korn (from left to right).

tum dot lasers as the light sources and a MEMS mirror for beam scanning. Some of the ongoing studies in Japan and Europe including low-vision aids and navigation surgery were presented.

The second plenary was presented by Hideo Hosono, Director of Material Research Center of Element Strategy, Tokyo Institute of Technology, and recipient of the Japan Prize in 2016. With the title of "Cultivation of Electro-Active Functionality in Transparent Oxides", Prof. Hosono, sometimes called alchemist of the present age, has reviewed his exploration of semiconducting functionality in transparent oxides, covering transparent amorphous oxide semiconductors and their TFT application, iron-based superconductors, and electro-active function utilizing abundant elements.

Masanori Iye, Vice-chair and the Japan representative of the TMT International Observatory, presented a talk titled "The Thirty Meter Telescope Project". With this 30-meter telescope, which is constructed by an international consortium of Japan, USA, Canada, China and India, he has shown that various discoveries will be obtained in many fields in astronomy and as-

trophysics, including the early history of the Universe, extra-solar planets, dark matter and dark energy, and active galactic nuclei.

The fourth plenary talk was presented by Georg Korn, Science and Technology Manager of the ELI Beamlines in Prague, titled "Extreme Light Infrastructure (ELI): The CERN of Laser Research". The ELI project comprises 3 pillars: ELI-Beamlines in Czech Republic, ELI-ALPS, the attosecond laboratory in Hungary, and ELI-NP, the photo-nuclear laboratory in Romania. The 4-th pillar for extreme high field science is to be determined in future. It is expected that ELI-ERIC (European Research Infrastructure Consortium) will be established in 2018 to manage and operate these facilities within the central governance framework. Dr. Korn has presented the ELI framework and the up-dated progress at the ELI-Beamlines.

The OPIC Plenary has been highly evaluated in previous years due to broad coverage of important and up-dated subjects with excellent speakers. In OPIC2016, plenary presentation from the industry (QD Laser, Inc.) was given for the first time. With this new addition, the OPIC plenary became even more attractive, covering broader scopes on science, technology and real-world applications.

The OPIC Reception was started by Sadao Nakai, Chair of the International Advisory Board, followed by the greetings by the representatives of OSA (Thomas M. Baer, President in 2009) and SPIE (Toyohiko Yatagai, President in 2015). Drinks were toasted by Gerard Mourou (Ecole Polytechnique, France) and Sergei Bulanov (QST, Japan), leading to very active interactions among the participants (Fig. 4).

#### 4. Acknowledgement

We are indebted to Prof. Kenichi Iga, Dr. Christopher P. J. Barty, and Prof. Andreas Ostendorf as Congress Co-Chairs, members of the International Advisory Board, Organizing Committee and Steering Committee, and Chairs of the Specialized International Conferences, for organizing OPIC2016.



Fig. 4 OPIC2016 Reception. Greetings by S. Nakai, T. Baer and T. Yatagai, and toast by G. Mourou and S. Bulanov (from left to right).

We would like to thank MEXT, METI, MAFF, MHLW, MLIT and Keidanren for supporting OPIC2016.

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