



EPIC Members Event Reports Photonics West 2013

San Francisco, USA
2-7 February 2013

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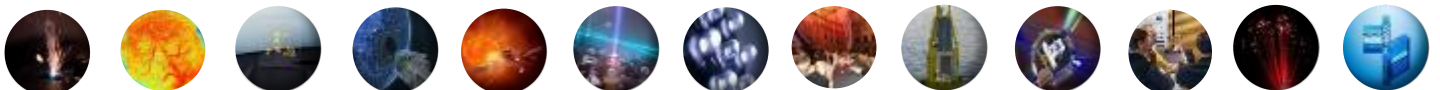
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About the EPIC Members Event Reports

Initiated by the founder of EPIC Dr. Thomas Pearsall in 2003, these reports are prepared by members of EPIC to the benefit of the wider community. If you did not have a chance to attend the event but would like to know some key highlight, this report is for you. Emphasis is placed on exploring technical and business opportunities for the members of EPIC. If you are an event organizer and would like your event covered by EPIC, if you would like to volunteer for writing a report, or if you have any comments to this report, please contact info@epic-assoc.com



Introduction

Photonics West, the most prominent Photonics and Laser event on the other side of the Atlantic, took place on February 2-7 at the Moscone Center, its traditional location in San Francisco. With record-breaking registration, 20,737 attendees joined the event this year, combining five conferences (BiOS, LASE, MOEMS-MEMS, OPTO and GREEN PHOTONICS), two tradeshows, and a number of industry panels, workshops and networking events.

Exhibitions

Attendance was up for both tradeshows: BiOS continues to be the world's largest biomedical optics and biophotonics exhibition with 224 companies exhibiting on the opening weekend. The Photonics West exhibition was held Tuesday through Thursday, with 1,238 exhibitors showcasing their latest products in laser technology, optoelectronics, optical components, and other fields of the photonics industry. Europe had strong representation with pavilions from France, Germany, Great Britain, and Holland. The tradeshow also hosted its traditional Prism Award ceremony (dubbed the "Oscars of Photonics") highlighting the most innovative developments in different categories (Defense and Security, Detectors, Green Photonics, industrial and scientific lasers, information and communication, life science, optical components, light sources and metrology). Two European companies were distinguished with this award: Leosphere (Orsay, France) in the Green Photonics category for their R-MAN510 Raman Lidar Super ceilometer, and in the Manufacturing category, The Heidelberg Instruments (Heidelberg, Germany) with the MicroPG501 Direct-Write Lithography System, a desktop maskless aligner

lithography tool able to write small patterns into photoresists without using a photomask.



Photonics West 2013 trade show

In addition to the individual symposia, the Photonics West technical program includes around 120 short courses and 10 industry and professional development workshops and several panel discussions. Panel discussions topics included "Prospects and future of microfluidics", "Optical photonics in pulmonary: applications and limitations to clinical translation" and "Harnessing biophotonics to study tissue biomechanics".

BiOS

The BiOS symposium, chaired by Jim Fujimoto (Massachusetts Institute of Technology) and R. Rox Anderson (Wellman Center for Photomedicine), keeps gaining momentum over the years, as the technologies get closer to clinical applications. One of the hot topics of the symposium was optogenetics, the ability to control biological cells with light. The developments target both the biochemical markers added into neural circuitry, and the optical methods used to activate or regulate them. Neurons are optically stimulated and neural dynamics can hence be mapped, opening a whole new field in biophotonics. Optical coherence tomography (OCT) was also a strong part of BiOS program, demonstrating a clear

transition towards clinical studies. New developments in swept-source-based OCT systems with high coherence length demonstrated fast imaging beyond depths of 3 millimeters. Several groups also showed outstanding results in micro-OCT, which allows in-vivo imaging of individual cells. A number of companies, including Santec, Tornado Spectral Systems, Exalos, Gooch & Housego and Thorlabs, had OCT-related products on display at the show. Another hot topic competing with OCT in terms of number of papers presented is photoacoustic imaging, whereby sound waves are generated by laser pulses absorbed by a target tissue and detected at the surface of the tissue. This technique holds great promise for early cancer detection, for instance. Finally, the new BIOS conference on *Bioinspired, Biointegrated and Bioengineered Photonic Devices* presented new types of electronic cameras inspired by nature that could soon outperform conventional flat detectors or improve the state of the art in night vision or endoscopy.



Photonic West Prism Awards ceremony

LASE

The LASE symposium covered both basic and applied research in laser physics and technology. The development of high-power lasers and their application in advanced material processing were strong

on the agenda of this year's symposium, chaired by Bo Gu (Bos Photonics) and Andreas Tünnermann (Fraunhofer Institute for Applied Optics and Precision Engineering). With the increasing use of laser in manufacturing, laser processing schemes are being expanded from robust processes like cutting, welding, drilling to more novel processes like hardening, surface treatment, and other low-damage modification of metal and dielectric materials. On the technology side, many papers addressed the continuing ramp up in laser power and performance, based on the development of new fibre laser and disk laser architectures. Focus was put on coherent combining techniques, one of the keys to cost-effective power scale up of ultrafast lasers. It is worth noting that IPG Photonics plans to release a 1ps, 100uJ, 100W system this year, as announced by company CEO Valentin P. Gapontsev. During the show, it was also announced that TOPTICA Photonics AG acquired the majority ownership of Berlin-based laser diode maker eagleyard Photonics GmbH. On the application front, presentations stretched from laser-manufactured photonic nanostructures and three-dimensional metamaterials to additive manufacturing methods and laser processing for light weight structures in the automobile industry. The automobile industry continues to be a strong drive for the laser market, with laser welding on the top of the list of the car manufacturing laser toolbox. On a more fundamental level, the development of laser plasmas were investigated for future compact particle accelerators for x-ray and gamma ray sources, as a path towards TeV physics.

OPTO

The OPTO symposium was chaired by David L. Andrews, Univ. of East Anglia

Norwich and covered a wide range of topics from optoelectronic materials, nanophotonics, quantum optics, to displays and holography, semiconductor laser and LEDs, and optical communications. Some of the buzz words included quantum optomechanics, with a paper from Markus Aspelmeyer (University of Vienna) presented at the conference plenary session. Aspelmeyer gave some insight on the latest developments in quantum manipulation of photons, laser cooling and gravitational wave detectors. Other plenary sessions included works of Richard Soref (University of Massachusetts) on silicon-based photonics for the mid-infrared and of Miles J. Padgett on orbital angular momentum of light beams. During the "Fiber and Waveguides" session, of the *Organic Photonic Materials and Devices* conference, Dow Corning and IBM unveiled a system meant to replace copper links as circuit connections, enabling more energy efficient supercomputers and data centres. Northwestern University succeeded in developing the first room-temperature CW quantum cascade laser in the short wavelength range (typically 3 to 3.5 μm , which coincides with hydrocarbon absorption bands). Finally, Daylight Solutions demonstrated a broadly-tunable high-resolution CW laser based on QC devices



OPTO plenary talk on "Quantum optomechanics," Markus Aspelmeyer (Univ. of Vienna)

MOEMS-MEMS

The scope of the MOEMS/MEMS symposium was to present new developments of MOEMS and MEMS technologies at both basic research and commercialization stages. The conference, chaired by Harald Schenk (Fraunhofer Institute for Photonic Microsystems) and David L. Dickensheets (Montana State University) covered topics about devices, applications and reliability, as well as micro and nanofabrication processes. Other topics include adaptive optics, microfluidics, BioMEMS and medical microsystems, advanced micro- and nanofabrication technologies for optics and photonics, MOEMS displays and imaging, and miniaturized microsystems and their applications. In one of the plenary sessions, Bozena Kaminska (Simon Fraser University) reviewed present limitations of nano-optics and the new generation of devices and their manufacturing. In another plenary session, Aaron Knobloch presented MEMS-based sensors developed for accurate pressure measurements within the harsh environment of geothermal wells. Finally, Kaili Jiang (Tsinghua University) presented interesting properties of superaligned carbon nanotube (CNT) and their applications, such as field and thermionic emission electron sources, high strength CNT yarns, electrodes for batteries and supercapacitors, loudspeakers, incandescence displays, SERS substrates, and IR detectors.

GREEN PHOTONICS

Green Photonics is a "virtual symposium" within SPIE Photonics West. Now in its third year, the Green Photonics symposium highlighted 55 papers from the three symposia (OPTO, LASE, and MOEMS-MEMS) in technologies surrounding energy sources and energy

efficiency, sustainability and conservation. Key topics included solid-state lighting and displays, laser-assisted manufacturing and micro/nano fabrication, communications, and renewable energy generation through fusion and photovoltaics. According to Stephen J. Eglash (Stanford University), chairman of the Green Photonics symposium, “we will see more of an explosion of a truly worldwide photovoltaics industry, much like today’s automotive industry”. Indeed, several of the talks focused on laser-based processes to manufacture or improve the efficiency of solar panels. LED lighting was of course another strong focus of the symposium with several papers dedicated to ways and means towards higher efficiencies.

European Projects in the spotlight

Photonics West was also an opportunity to showcase some European projects from the FP7 program. Whether through the technical conferences or even as demonstrations at the exhibitions, several FP7 projects were in the spotlight in San Francisco: Arjen Boersma (TNO, Netherlands), technical manager of the project, presented at the OPTO symposium the concept of FIREFLY, a project addressing multilayer photonic circuits made by nano-imprinting of waveguide and photonic crystals (<http://www.fp7-firefly.eu/>). Boersma presented new developments in polymer based, single mode, optical interconnects for board level communication, that are manufactured using the nano-imprint lithography method.

The first prototype of the FEMTOPRINT project (<http://www.femtoprint.eu/>) was also on display at the Photonics West exhibition on Amplitude Systemes’ booth (#1615), one of the project partners. FEMTOPRINT is a European project (FP7) aiming to develop a femtosecond laser-based printer for micro-/nano- systems fabricated out of glass.



Prototype of the FEMTOPRINT project on display at Photonics West

The 5-Mile Photonics West run: 1st edition

French start-up company Resolution Spectra Systems organized the first edition of the 5-Mile Photonics West run on Tuesday, February 5. Enthusiastic joggers picked up their T-shirt and jog map at the company booth the day before, and gathered in the early morning for a pleasant but energetic jog along the Bay. Is there a better way to prepare for an intense day of highly technical conferences?



Photonics West participants of the 5-Mile morning run organized by start-up company Resolution Spectra Systems

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About ALPhANOV

ALPhANOV is a private, non-profit organization and is the Technology Center of the French “Route des Lasers” competitiveness cluster. It provides technical resources and expertise required to fulfill R&D challenges and innovative development in photonics, optics and lasers. Located in the Bordeaux area, ALPhANOV employs about 35 highly skilled Researchers, Engineers and Technicians. The Technological Center offers dedicated facilities and equipment for laser developments, implementation and characterization. It has strong expertise in laser micro-machining developments, optical design and prototyping in vision, microscopy and spectroscopy, and fiber Laser sources and optical fiber components. Website: www.alphanov.com



About EPIC – European Photonics Industry Consortium

EPIC is a membership-led not-for-profit industry association that promotes the sustainable development of organisations working in the field of photonics. Our members encompass the entire value chain from LED lighting, PV solar energy, Silicon photonics, Optical components, Lasers, Sensors, Displays, Projectors, Optic fiber, and other photonic related technologies. We foster a vibrant photonics ecosystem by maintaining a strong network and acting as a catalyst and facilitator for technological and commercial advancement.

EPIC Members (1 February 2012)

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