Community

Conference Notes

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Review: 117th Annual Meeting of the DGaO/ICO International Conference on Applied Optics and Photonics 2016

Hannover, Germany, May 17–21, 2016

For the first time ever, the International Commission for Optics (ICO) convened jointly with the German Society of Applied Optics (DGaO) for their annual meeting and the International Conference on Applied Optics and Photonics 2016, respectively. Supported by Volkswagen-Stiftung, the event was held in the marvelous Schloss Herrenhausen building.

Some of the core activities of the ICO are support of optics education, research in third-world countries, and equality issues in optics research. Two sessions were dedicated to these subjects. The Women in Optics session started with a presentation by Elizabeth A. Rogan, the CEO of the Optical Society OSA. She reviewed the status of female scientists and some of the reasons for the gender imbalance. As a take-home message, she encouraged all female scientists (and engineers) to break the stereotype and to be a role model for the next generations. Local junior research group leader Merve Wollweber continued with a look at the 'academia perspective.'

As usual, the main presentations circled around topics of applied optics. Perhaps the best-attended session with about 100 people was 'Industrial 3D-Metrology.' Obviously, such technology is in strong demand in the industry for the purpose of quality and process control. Trends go toward inline detection and the continuous acquisition of exact three-dimensional (3D) data sets. As an example, Florian Willomitzer from the University Erlangen Nuremberg presented a '3D motion picture camera' for single-shot, high-resolution 3D imaging.

Another major driver for many different presentations was biophotonics. Jürgen Popp from the Leibniz Institute of Photonic Technology in Jena showed some stunning pictures of how fast sepsis can kill people. Here, photonic technologies may offer solutions that could save thousands of lives every year.

DGaO young scientists awards

Biophotonics were also the focus of this year's winner of the DGaO prize for the best master's thesis. Carsten C. Reichert from the Institute for Technical Optics at Stuttgart University presented a simple solution for the conversion of a smartphone into a microscope. His idea involves one more smartphone lens for <5 USD plus a 3D printed table where users can fix smartphone, optics, and sample. The whole setup is simple, cheap, and easy to carry. The device might therefore be used in developing countries for medical purposes of biology education around the world.

3D printing was the focus of the prize for the best PhD thesis. Timo Gissibl from the 4th physics department of Stuttgart University received the award for his work on complex microoptics generated with two-photon 3D printing.

The ICO Awards for Aydogan Ozcan and Frank Koppens

Aydogan Ozcan, the Chancellor's Professor of Electrical Engineering and Bioengineering at University of California Los Angeles Henry Samueli School of Engineering and Applied Science, delivered the Ernst Abbe Lecture with a presentation on 'Democratization of next-generation microscopy, sensing and diagnostics tools through computational photonics.' Ozcan's topic actually expanded on the topic of the DGaO Young Scientist Award on a higher level. Ozcan received the ICO Prize, the Commission's highest honor. He was also honored with the Ernst Abbe Trophy from the Carl Zeiss Foundation for his seminal contributions to bio- and nano-photonics technologies impacting computational microscopy and digital holography for telemedicine and global health applications. Ernst Abbe (1840–1905) was a German scientist who pioneered optical microscopy, and is considered one of the founders of modern optics and microscopic imaging systems.

The Young Scientist Award of the International Union of Pure and Applied Physics was presented to Frank Koppens, ICREA Professor at ICFO Barcelona, and leader of its nano-optoelectronics group. The prize citation reads 'for his remarkable, outstanding, groundbreaking, pioneering and numerous contributions to Nano-Optoelectronics.' This prize is awarded to individuals who have made noteworthy contributions to applied optics and photonics during a maximum of 8 years of research experience after having earned a PhD degree. This prestigious prize clearly recognizes Koppens as someone to watch for in the future for even more outstanding scientific contributions to optics and photonics.

Noble laureate Stefan Hell gave the 2016 Fraunhofer lecture

The social program of the DGaO's annual meetings is always very inspiring. In the past, we have seen medieval monasteries as well as famous gardens and castles. This year, the attendees visited one of the cathedrals of modern production: the Volkswagen car factory in Wolfsburg. The factory tour showed the attendees probably one of the most sophisticated production areas in Germany.

While this was a truly impressive tour, people were even more impressed and excited at the Fraunhofer lecture on Friday afternoon. Noble prize winner Stefan Helm spoke about his way to get a microscope's resolution beyond Abbe's limit. His persistence in scientific research may serve as a good example for researchers in all fields to pursue high goals even if most other scientists do not believe in them. His take-home message: take the perspective of a child to your research. Only such a simple and remote perspective allows us to overcome limitations and open up pathways for new science.

The 118th annual meeting of the DGaO will take place from June 6 to 10, 2017, in Dresden, Germany. The next International Conference on Applied Optics and Photonics of the ICO will be held on 21–25 August in Tokyo, Japan.

http://www.dgao.de/de/jahrestagung.

Review: International Laser Technology Congress AKL'16

Aachen, Germany, April 27–29, 2016

The International Laser Technology Congress AKL'16, Europe's leading conference on the applications of laser technology, was held in Aachen, April 27–29, 2016. This year, the congress focused on micro and macro processing, as well as offering special forums dealing with process monitoring and additive manufacturing. The opening of the Photonics Cluster on the RWTH Aachen Campus begins a new chapter in the cooperation between research and industry.

Every 2 years, the Fraunhofer Institute for Laser Technology ILT holds the International Laser Technology Congress AKL in Aachen. Europe's biggest industry conference for applied laser technology in production drew more than 690 participants this year – an increase of 10% on 2014. The conference has also become more international, this year attracting 196 visitors from abroad, from a total of 27 different countries. The sponsors' display also filled up very early on, with 52 companies represented.

The core of the AKL program was the specialist conference with three separate sessions; however, on top of that, there were also a variety of additional events, including an introductory seminar on laser technology, specialist forums on process monitoring and additive manufacturing, and a number of evening events. Lasertechnik Live,

During the 117th Annual Meeting of the DGaO, participants had the chance to enjoy the wonderful baroque garden at Schloss Herrenhausen (photo: Andreas Thoss).

a guide to the laser application center of the institute, proved extremely popular this year, with 91 live presentations of current projects under way at Fraunhofer ILT.

A definite conference highlight was the presentation of the 2016 Laser Technology Innovation Award in the coronation hall of the Aachen town hall. The prize is awarded by Arbeitskreis Lasertechnik e.V. and the European Laser Institute ELI in recognition of an outstanding contribution in the field of industrial laser technology. This year, the first place and its prize money of 10,000 euros went to Dr. Armand Pruijmboom and his team at Philips Photonics GmbH Aachen for their development of VCSEL arrays as a new high-performance laser technology for the digital heat treatment of workpieces.

Improving efficiency and the commoditization of laser sources

AKL's specialist technology conference examines every step of beam source development, right up to the most diverse applications. This year revealed multiple trends. First of all, it seems that beam source development is focusing less on disruptive technologies and more on improving the efficiency and performance of existing ones. Fiber lasers are now available at powers of up to 100 kW, while direct diode systems are reaching the 50 kW mark. Initial investigations at Fraunhofer ILT also confirm that diode lasers are now suitable for laser cutting. At the same time, we are seeing that systems are becoming more and more comparable, with commoditization leading to a price war and further consolidation within the sector.

Ultrafast lasers are still relatively new to system providers' portfolios. The market for systems up to around 150 W is growing disproportionately quickly, and applications in the electronics, semiconductor, and consumer goods industries were presented at the AKL. The missing ingredient is productivity. One solution is the multi-beam system offered by Aachen start-up Pulsar Photonics, while the availability of suitable laser cables (PT Photonic Tools) should also help. Various groups are also working on developing ultrafast lasers with kW power. It seems only a matter of time before these will be available to industry.

Special forums on process monitoring and additive manufacturing

Participants in the full-day forum on laser additive manufacturing also agreed that productivity is the key to the wider spread of additive manufacturing techniques. Components made using additive manufacturing techniques have already proved to be game changers in turbine construction, and we are seeing a constant stream of new applications in aircraft design and the automotive sector. Multi-beam approaches could be a way to ensure even more widespread use, a corresponding project at Fraunhofer ILT is aiming to increase productivity by 30-fold.

The new forum on process monitoring attracted a good crowd, with the number of attendees far surpassing the organizers' original expectations. Presentations looked at various sensor systems and experiences in implementing process monitoring systems in an industrial context. Here, inline measurements are becoming more and more widespread. Great progress has been made on the various sensors; the problem now has to do with evaluating individual images, as the rate of pseudo errors is often still too high. Understanding of many processes also remains limited, which restricts the chances of an effective simulation.

In order for users to share their experiences regarding the increasingly varied and complex processes more efficiently, the 'Industry working group for process control in laser material processing' has now been set up in Aachen.

Growing complexity and dynamic market movement

In the Gerd Herziger session, representatives from TRUMPF, ROFIN-SINAR, Coherent, and JENOPTIK discussed the outlook and challenges for various markets. Peter Leibinger (TRUMPF) took a look at the lightweight engineering market and observed that though this is a big market for laser technology, it consists of many niches experiencing moderate growth. However, he assessed the requirements in these niches as complex, leading to high development costs. In his opinion, the only chance for growth in this market is to open up new niches or drive out other providers from the marketplace.

Mark Sobey (Coherent) gave a talk on the semiconductors and electronics market. He expects to see more use of fast and ultrafast lasers at reduced cost per watt. In his estimation, no one platform would be likely to emerge victorious; the crucial factor will be adapting processes to the applications. With a view to the increasing labor costs in China, Sobey expects to see a surge in automation technology. He believes the greatest challenge lies in offering fast global service for the various applications in question.

In the subsequent discussion, all participants agreed on the need for more efficient development processes.

However, opinion differed as to the merit of expanding cross-sector partnerships, Leibinger seeing it as an effective way forwards and Sobey rejecting the approach, pointing to bad experiences in the telecoms sector.

Photonics Cluster: Networking 4.0

Fraunhofer ILT can look back on a long history of success when it comes to the partnership between industry and research. This year, a new chapter began on April 28, 2016, with the ceremonial opening of the first building of the Photonics Cluster on RWTH Aachen's new campus.

Here, companies from industry will work with experts from RWTH Aachen University and several of the Fraunhofer Institutes on new projects focusing on the use of light as a tool in industrial production. Picking up on the creative atmosphere of start-up companies, there will be scrum areas as well as conventional offices and laboratories. Teams will be able to develop ideas together in large open-plan spaces.

At the ceremonial opening, Professor Reinhart Poprawe, director of Fraunhofer ILT and the Photonics Cluster, announced that 90% of the space has already been rented out. The first 150 employees will move in over the next couple of weeks, including those from the Aachen Center for Additive Manufacturing – ACAM. Members of this center include various Fraunhofer Institutes, departments of RWTH Aachen University and Aachen University of Applied Sciences, as well as technology-focused spin-offs near the RWTH Aachen Campus who work with companies from the region as well as big international corporations. The focus is on training and contract research into additive manufacturing. Fraunhofer ILT and its network in Aachen also coordinate the Digital Photonic Production strategic research initiative funded by the German Federal Ministry for Education and Research. Over the next 15 years, this initiative will be providing funding of up to 2 million euros a year for industry-relevant projects dealing with additive, ablative, and structuring laser techniques.

Summary

The opening of the Photonics Cluster at AKL'16 saw the beginning of a new chapter in the cooperation on the development of industrial laser technology. Here, partners

The first building of the Photonics Cluster on the RWTH Aachen Campus, now ready for its new tenants. The second building, due to be completed in 2018, is being built directly behind the first (Copyright: Fraunhofer ILT, Aachen/Andreas Steindl).

from research, Fraunhofer Institutes, and companies big and small will come together in an open, collaborative environment with state funding to bring new ideas from the laboratory to the marketplace. Over the coming years, the other clusters will be added to the new RWTH Aachen Campus, thus lending the networking of research and industry an interdisciplinary dimension.

There was much discussion at AKL'16 about the growing complexity of materials and processing techniques as well as new trends such as industry 4.0. Participants also felt that the development of new technologies must become faster at the same time. The closer collaboration between research and industry afforded by the new RWTH Aachen Campus could be a good way to come to terms with this complexity and dynamic movement. At the very least, it seems a very promising concept in terms of leveraging and bolstering local advantages to maximum effect with a view to global competition, as well as offering the opportunity to make a worthwhile contribution to megatrends of social import.

Supporting organizations of the AKL

- Arbeitskreis Lasertechnik AKL e.V.
- European Commission
- EPIC – European Photonics Industry Consortium
- European Laser Institute ELI e.V.
- OptecNet – Innovation Networks for Optical Technologies
- SPECTARIS – German Industry Association for Optical, Medical and Mechatronics Technologies e.V.
- VDA – Association of the Automotive Industry e.V.
- VDI – Technology Center GmbH
- VDMA – Association of German Machinery and Plant e.V.

Dates and links

- ICTM – Conference, February 15–16, 2017, Aachen, Germany: www.ictm-aachen.com/en/Conference
- UKP Workshop 2017, April 26–27, 2017, Aachen, Germany: www.ultrakurzpulslaser.de
- International Laser Technology Congress AKL'18, May 2–4, 2018, Aachen, Germany: www.lasercongress.org
- Industry Working Group for Process Control in Laser Material Processing: www.laserprocesscontrol.org
- Aachen Center for Additive Manufacturing ACAM: www.acam.rwth-campus.com
- Center for Digital Photonic Production DPP: www.dpp.rwth-campus.com