

EPIC NEWS

THE QUARTERLY EPIC NEWSLETTER FOR PHOTONICS

EDITORIAL

Photonic Components for Broadband Communication

Optical technologies and components are building the basis of today's telecommunication infrastructure, and their contribution for providing a true broadband capacity to the end-users will be even larger in the future. After the 'dotcom' bubble and its subsequent traumatic implosion, the optical communication and components industries are in a process of consolidation and cost reduction, to survive and grow in a market, correcting itself from short term over-investment and over-capacity. At the same time, the global need for bit rate capacity has just been increasing all the time, almost independently of these economical perturbations. The perspectives for the future are now looking significantly better. Communication networks will be more and more optical, and we believe it is the right time to evaluate the situation for the development of new optical components in the European industrial and academic contexts.



EPIC members are organising a workshop on photonic components for broadband communication to address all these important issues. It will be held on June 28 and 29 in Stockholm, at a time of the year when day light basically never disappears. These white nights of the photonic component community will be highly suitable for an intensive thinking about how to make the component European industry profitable in the future. It will be a natural continuation of the efforts undertaken in the framework of the Technology Platform Photonics²¹.

Photonic components, when part of the physical telecom equipment, are what the networking and system people call Layer Zero. This accidental nullification expressed by the terminology is in fact highly symptomatic. Most of the time, this ground level is taken for granted and the attention is on the most sophisticated constructions built on it. Large Telco suppliers, and this applies very much to European ones, have done their best to evacuate the difficult profitable components branch from their edifice. It is true that decisions on top are, in almost all cases, governing the life of lower layers. However, this "almost" is indeed crucial and there are famous examples showing that key components have totally modified the optical communications and their networks: diode lasers, low-loss single mode fibres, erbium-doped fibre amplifiers and, today, reconfigurable and integrated components. New technologies will continue to lead to component breakthroughs enabling cost effective, manageable networks capable of supporting next generation broadband services. New products and processes will generate an increasing economic activity for the photonics industry into the 21st century.

European component industries have a central role to play in the future. Owning a substantial part of the optical telecommunications ground will make sure that our constructions will be able to stand up sustainably.

Pierre Yves Fonjallaz
Director of Kista Photonics Research Center in Stockholm, Sweden

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European Photonics Industry Consortium

Photonics²¹: Strategic Research Agenda

www.photonics21.org

OPERA Forum presents the vision for R&D in FP-7

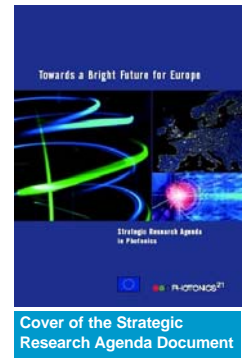
Alexander von Witzleben, President of Photonics²¹, the photonics technology platform, handed over the Strategic Research Agenda (SRA) to European Commissioner Viviane Reding in Strasbourg on 4 April, during the SPIE Photonics Europe Congress. This document, which represents four months of hard work by members of the technology platform, can be downloaded from the EPIC website: www.epic-assoc.com. A limited number of printed copies are also available. Please write us if you would like to have one.



Alexander von Witzleben, Photonics²¹ President and Viviane Reding, European Commissioner in Strasbourg. In accepting the SRA, Reding addressed the entire conference, in the presence of Jerzy Buzek (MEP Poland) and the Photonics²¹ Executive Board, emphasising her support for the Photonics Platform and a stronger research budget.

All EPIC members are also members of the Photonics²¹ platform, and many have participated directly in writing the SRA. The resulting document is a blueprint for investment in R&D in Framework Programme-7 (FP-7), scheduled to start in January 2007.

EPIC organised the OPERA forum as part of its participation in the EC project OPERA-2015. The objective of the OPERA Forum is to introduce the public to the content of the Strategic Research Agenda for Photonics²¹. Distinguished speakers from around the world presented a vision for R&D in FP-7, based on the major themes highlighted by the SRA:



Cover of the Strategic Research Agenda Document

OPERA²⁰¹⁵

- **From the "Lisbon Agenda" to a "Strasbourg Agenda", Framework Programme 7 and The Photonics Technology Platform, Henri Rajbenbach**, European Commission, Brussels, Belgium

- **Photonics²¹: Light Takes a Quantum Leap in Europe, Bernd Schulte**, Vice-President Photonics²¹, and COO, Aixtron, Aachen, Germany

- **Photonics Components in the Network, John Oberstar**, Cisco Systems, San Jose, CA, USA

- **Laser-assisted Manufacturing Machine Vision, Koji Sugioka**, RIKEN, The Institute of Physical and Chemical Research, Wako-Shi (Saitama-Ken), Japan

- **Photonics Technology in Life Sciences and Health Applications, Sune Svanberg**, Lunds Universitet, Lund, Sweden

- **Lighting and Displays, Bernhard Stapp**, Osram Optical Semiconductors, Regensburg, Germany

- **Photonic Sensors Applied To Security, Germán Vergara**, Centro de Investigación y Desarrollo de la Armada (CIDA), Madrid, Spain

- **Design and Manufacture of Components, James O'Gorman**, Eblana Photonics, Dublin, Ireland

- **Photonics Education in Ontario 2000 – 2006: A Vision Realized, Marc Nantel**, Photonics Research Ontario, Toronto, Ontario, Canada

EPIC members have received a CD-ROM with all of the presentations and details of this milestone event. The next symposium on Photonics Technologies for FP-7 will take place in Wroclaw, Poland on October 12-14, 2006. For more details: www.if.pwr.wroc.pl/~opera2015



The OPERA forum on the SRA played to an overflow attendance, marked by focussed attention and enthusiastic participation of the audience

EPIC Mission to Taiwan: R&D Investment in Nanotechnologies

www.epic-assoc.com

EPIC General Secretary Tom Pearsall has completed a 10-day mission to Taiwan, (18-27 April 2006) sponsored by the European Commission and the Taiwan National Science Council. Taiwan is in the third year of a 600 million euro investment in nanotechnology development. During 2005, about 15 million euros were invested in basic R&D while 66 million euros were invested in tech-

nologies and engineering for industrialisation. Help in organising this visit came from Peter Shih of PIDA (Photonics Industry Development Association), EPIC's sister organisation in Taiwan.

During the first week Pearsall was part of a visiting group from the European Commission with the objective to



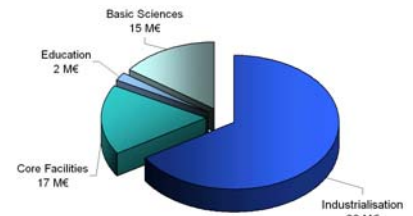
Cuo-Chung Chi, Deputy Minister at the National Science Council of Taiwan and General Secretary Tom Pearsall during the EPIC mission to Taiwan in April

explore possible avenues for participation of Taiwanese universities in European Commission R&D programmes. Pearsall carried out a workpackage of the MONA project, implementing a bi-lateral exchange of information on technology and on investment in resources for development of photonics

and nanotechnologies in Taiwan. In the course of the second week, Pearsall visited the Epistar fab in the Hsinchu Science Park, and carried out extensive discussions at the deputy minister level at the Taiwan National Science Council.

Many of the personalities now leading the development of science and technology policy in Taiwan have been

educated in the US, and have had successful careers in top-flight laboratories, such as Bell Labs or IBM. "I was pleasantly surprised by the number of professional colleagues and friends that I discovered in decision-making positions", Pearsall remarked following his return. "A particular highlight was the occasion to renew my acquaintance with Deputy Minister Gou-Chung Chi. We worked together for 10 years at Bell Labs in Murray Hill. Now he administers the distribution of the 1.3 billion euro budget of the National Science Council. We have already made plans to see each other again during the coming year."



2005 Funding allocation for nanotechnology R&D in Taiwan.

EPIC will issue shortly a report to its members on the details of the visit to Epistar, and a CD-ROM on current nanotechnology R&D project in Taiwan.

EPIC Holds Annual Meeting in Strasbourg: 2005 Accounts are Approved and Planning for EPIC Actions in the Age of the Photonics Technology Platform is Started

www.epic-assoc.com

On 3 April, EPIC members gathered in Strasbourg for the 2005 annual meeting. The accounts for FY 2005 were presented, discussed and approved unanimously by the members in attendance representing more than 60% of the consortium. Planning for a successful year 2006 was high on the agenda:

Presentation of the budget for 2006 of 350 000 euros

Projects for 2006:

- Roadmap for Photonics in the Automobile
- A new European project: ACCORD, implementing exchange of prototype components
- Workshop on Components for Broadband Communications in Stockholm, Sweden
- Symposium on Photonics²¹ in Wroclaw, Poland

Strategic Planning:

- Coordinating the leadership by EPIC members of the Photonics²¹ Technology Platform
- Consideration of new working groups for developing actions to be implemented by the Photonics²¹ Platform
- Database for better networking and communication among members
- Evolving the EPIC working groups to create more added-value for members
- Improving the governance of EPIC and involvement of more members, particularly small and medium-sized enterprises.

Following the meeting we attended the annual EPIC banquet at the Tire-Bouchon restaurant in Strasbourg, with a special guest appearance by Michel Viaud, the Director of the European Photovoltaic Industry Association, one of EPIC's collaborative partners.



At the EPIC annual banquet, EPIC members filled the house at the Tire-Bouchon. In the photo from left to right: Klaus Schulz, Merge Optics; Paul van Dyke, ASML; Huub Ambrosius, Cedova; François Creuzet, Saint Gobain; John Reid, Cedova; Martine Keim-Paray, EPIC; and Henning Schroeder, Fraunhofer Institute for Reliability and Microintegration

EPIC's New Members

EPIC is pleased to welcome 4 new members who have recently joined the Consortium. They are:

France Telecom R&D

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Laser Diagnostic Instruments

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TECHNOLOGY

ASML Presents Immersion and EUV Alpha-Demo Tool Advancements at SPIE Microlithography 2006 in San Jose



Contact: Angelique Paulussen – Corporate Communications – +31 40 268 6572 – Veldhoven



ASML Holding NV presented its latest advances in leading-edge production technology as well as its research and development (R&D) progress at SPIE Microlithography 2006 in San Jose, California. Images down to 42-nanometer (nm) printed on the ASML TWINSKAN XT:1700i system were shown along with results that support the viability of this tool for volume production across several nodes. In addition, ASML presented proof-of-concept 35-nm images from its Extreme Ultra Violet (EUV) Alpha-Demo Tool (ADT) which is rapidly progressing in imaging qualification.

The XT:1700i, ASML's fourth-generation immersion system, features a 1.2 numerical aperture (NA) catadioptric lens and provides a 30 percent improvement in resolution compared with today's leading-edge dry tools. ASML's presentations demonstrate that the XT:1700i supports volume production at 45-nm.

ASML disclosed TWINSKAN XT:1700i images of record

resolution of 42-nm dense lines at an 84-nm pitch with a depth of focus of 1 micron at a field size of 26x33-millimeter (mm²). ASML also reported significant progress in defectivity levels of its immersion technology demonstrating that champion data are meeting production requirements.

ASML expects to ramp up volume production of XT:1700i systems in Q2 2006, enabling the semiconductor industry's transition to 45-nm imaging.

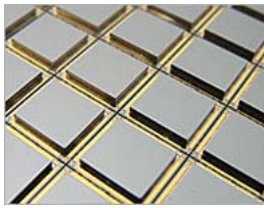
ASML also presented new results from its EUV ADT imaging qualification stage, including proof-of-concept 35-nm images, which could be obtained over the full slit of 26 mm. The first of two EUV alpha demo systems is fully assembled: its metrology sensors, wafer and reticle stages, and material handling modules are qualified, and the complete optical train (including illuminator and projection optics) is now in the final qualification process.

ASML expects its EUV systems will be a critical enabler not only for EUV infrastructure development for 32-nm lithography but also for the commercialisation of EUV lithography. ASML plans to ship the world's first 0.25 NA EUV systems in Q2 2006 to Albany NanoTech at the State University of New York at Albany, N.Y., and the Interuniversity MicroElectronics Centre (IMEC) in Leuven, Belgium.



SUSS Supports IMT Production Ramp Up for MEMS Devices

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SUSS MicroTec, a leading supplier of precision manufacturing equipment for the semiconductor and emerging markets, announced today the installation of an additional wafer bonding system at Innovative Micro Technology in

Santa Barbara, CA.

Innovative Micro Technology (IMT) requires additional wafer bonding capacity as part of its ramp up to volume production on several new MEMS products. These include novel patented IR emitters as well as MEMS switch products, both of which are now in production at IMT's

wafer fab, now in 24x7 operation.

"We're shipping over one million working MEMS switches every week and wafer bonding is a critical step and a core competency. These and our other devices have stringent process requirements both in terms of hermeticity and wafer yield. SUSS wafer bonders have demonstrated their ability to meet our manufacturing needs," said John Foster, CEO of IMT.

"We are pleased that our wafer bonders have the flexibility and performance to meet the needs of a leading MEMS foundry such as IMT, as evidenced by the repeat order for production tools"; said Michael Kipp, General Manager Wafer Bonder Division, SUSS MicroTec.

Project MC2ACCESS

Contact: ulf.sodervall@mc2.chalmers.se



MC2, the Nanofabrication Laboratory, at the Department of Microtechnology and Nanoscience, at Chalmers University of Technology, in Göteborg, Sweden, is now offering European Universities and SME's access free of charge to advanced processing in microwave electronics, photonics and nanotechnology.

MC2, research facility in nanoelectronics and photonics has secured a contract with the European Commission to open up the cleanroom laboratory to European users.

The EU-funded project started in January 2006, and will run for 48 months. The access is available for universities and other organisations that freely disseminate their results. The user groups accessing the infrastructure must be based in any of the EU-member states (except Sweden) or in any of the associate and candidate countries.

Project Manager:

Associate Professor Ulf Södervall
The Nanofabrication Laboratory

Project Coordinator:

Professor Stefan Bengtsson
Head of Department of Microtechnology and Nanoscience, MC2



Electron beam lithography system for patterning of nanostructures

JENOPTIK Laser, Optik Systeme GmbH Acquires 100 Percent of U.S. Microoptic Company MEMS Optical, Inc.

Contact: juergen.sebastian@diodelab.com

The Jenoptik Group is further expanding its microoptics business area within the Photonics business division. The acquisition of 100 percent of the stock of US firm MEMS Optical, Inc. will enable JENOPTIK Laser, Optik, Systeme GmbH to broaden its technical expertise in the development and manufacturing of microoptic components and microstructures. Subject to receipt of final regulatory approval, the closing is expected to be completed during the first quarter 2006.

MEMS Optical, Inc. specializes in the integrated development, fabrication, and distribution of high quality microoptic components. MEMS Optical uses Grayscale lithography (a patented process), which enables the

manufacturing of any shape in miniaturized form with maximum precision. In addition, MEMS Optical is one of the few companies in the microoptics market to integrate design and manufacture within its own fabrication plant.

JENOPTIK Laser, Optik Systeme GmbH was founded in 1995 and is a wholly owned subsidiary of the JENOPTIK AG technology group of Jena, Germany. In the fields of Laser Technology, Optics, Microoptics and Sensor Systems, the company develops, produces and distributes laser sources, optical components, modules and system solutions as well as the technologies used in the JENOPTIK Group.



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OSRAM Opto Semiconductors Wins 2006 Automotive News PACE Award

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OSRAM Opto Semiconductors announced that it has been named a 2006 Automotive News PACE Award winner at a gala ceremony in Detroit, MI last night. The prestigious award recognizes automotive suppliers for superior innovation, technological advancement and business performance. This is the first PACE (Premier Automotive Suppliers' Contribution to Excellence) award win for the solid-state lighting division of OSRAM GmbH.

OSRAM was recognized for its advanced Color on Demand (COD) Light-Emitting Diode (LED) innovation, first successfully introduced in General Motors' 2006 Chevrolet HHR, Monte Carlo and Impala cars. This breakthrough lighting technology enables automotive makers to specifically illuminate or paint the car interior cluster, radio buttons and some switches in any corporate brand color. This color effect serves to distinguish car brands from the pack as well as enhance the driver's experience.

OSRAM
Opto Semiconductors

"OSRAM is honored to receive the Automotive News PACE Award as an acknowledgement of the Color on Demand technology," said Ellen Sizemore, North American director, LED and IR Products Group. "This innovation not only brings unlimited color possibilities to auto makers to improve the driver's experience, but it also offers countless enhancements to safety and roadway signage and other forms of lighting."

OSRAM Opto Semiconductors won in the Product Category which recognizes innovations in new products or services or in new product and service development and introduction processes that have significant market impact and act as "game changers" in the automotive industry.

For complete details of the 2006 Automotive News PACE Award, including a listing and profile of OSRAM Opto Semiconductors: www.automotivenews.com/pace.

Epistar Orders Five Aixtron Multi-wafer Reactors

www.aixtron.com
www.epistar.com.tw

Epistar has placed an order with Aixtron for five MOCVD reactors designed for GaN LED production, including a tool with a 42x2-inch capacity.

The sale comprises four AIX 2600G3 reactors, along with Aixtron's brand new AIX 2800G4 reactor that is claimed to have the largest capacity of any commercial reactor and can accommodate up to 42 two-inch wafers. The recent order will reinforce Epistar's position as the leading manufacturer of LEDs in Taiwan, in terms of capacity, which was established last year when the company merged with UEC. "The additional tools will enable us to ramp-up production capacity in response to market demand with excellent cost-efficiency," remarked Ming-

AIXTRON

Jiunn Jou, senior vice president of Epistar. Jou added that the company was looking forward to being the first customer for the world's largest capacity epitaxy reactor for GaN growth.

According to Aixtron, the AIX 2800G4 features a redesign of most of the components, including the cell, offers easier operation and handling, and delivers improved reliability and reproducibility compared with previous designs.

During a recent visit, Tom Pearsall of EPIC learned that there are about 250 MO-CVD reactors operational in Taiwan, the majority of which have been supplied by Aixtron (see related story).

WORKSHOPS

EPIC Workshop on Photonic Components for Broadband Communication to be held on 28-29 June 2006 in Stockholm, Sweden

EPIC members voted last fall to indicate their preference for the workshop on "Components for Broadband Access". Pierre-Yves Fonjallaz of the Kista Photonics Research Center is heading up the organisation of The Workshop on Photonic Components for Broadband Communication which will take place on 28-29 June 2006 at the City Conference Centre Stockholm, Norra Latin, Stockholm, Sweden.

Photonic Components for Broadband Communication

will focus on the global opportunities for cost effective functions that can be realised by photonic components and systems for use in broadband networks. The workshop will also focus on resources that European industry needs to capitalise on those opportunities, including support from European and national R&D programmes. The goal is to strengthen the strategies developed in the Technology Platform Photonics21 to reinforce the European position in the manufacturing of photonic components and systems.



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Invited talks will review challenges and opportunities for photonics, and poster presentations will propose technology solutions from new materials and components to system designs. Participants will join focus working groups to develop specific recommendations for R&D priorities and continuing actions.

All EPIC members are encouraged to attend. You can register on the EPIC website:

<http://www.epic-assoc.com>

Or by contacting the SPIE:

<http://spie.org/Conferences/calls/06/eoc/>

Call For Posters

Present your research at this important workshop on components for broadband

Workshop on Photonic Components for Broadband Communication

28–29 June 2006 City Conference Centre Stockholm, Norra Latin, Stockholm, Sweden

Conference Chairs: **Pierre-Yves Fonjallaz**, Kista Photonics Research Ctr. (Sweden);
Thomas P. Pearsall, European Photonics Industry Consortium (France)

Topics:

1. The Strategic Research Agenda (SRA) of the Technology Platform Photonics²¹

- What recommendations for the implementation plan from the working groups on ICT and Manufacturing of Components?
- What actions are required for the implementation of the SRA?

2. Photonics in the communications network

- Where are the niches for photonic components and systems in today's networks?
- Fiber-to-the-Home: What photonics components and systems are needed? Lessons from Japan and Korea. What incitements could work to hasten FTTH in Europe, in China, in India?
- Techno-economics: What is the competitive environment of FTTH (vs wireless, copper)? How could wireless and optical access technologies be optimally combined? What are the emerging component technologies for access networks and what technologies will prevail?

3. Manufacturing of optical components for broadband communication

- Technologies for manufacturing cost reduction: integration, packaging, mass-production.
- Politico-economics: How can it be reintroduced or maintained in Europe?

4. Future and emerging technologies

- Novel phenomena: How to make practical use of coherent atom-light interactions?
- Novel or emerging materials: Low dimensional or nano-scale semiconductors (II-VI, III-V, silicon, germanium...), organic materials, self organized materials, artificial or metamaterials, such as photonic crystals and negative index materials. Silicon photonics, concepts and prospects. What would be the consequences of a siliconized photonics?
- Novel devices: Focus on functionality and ease of manufacture
- Using existing components in novel configurations to achieve advanced optical functionalities.

Invited Speakers:

Roel Baets, University of Ghent (IMEC) (Belgium): Silicon Photonics

Friedhelm Hopfer, Technical University of Berlin (Germany): High-speed vertical cavity semiconductor lasers

V. Shchukin (NL Nanosemiconductors GmbH, Germany): High brilliance photonic bandgap crystal lasers.

Henri Rajbenbach, EC officer (Belgium), FP6-EU projects on components for broadband communication.

Lars Thylén, Royal Inst. of Technology, KPRC (Sweden): Optical components for broadband communication, discussion about the strategies of Photonics²¹.

Urban Westergren, Royal Inst of Technology, KPRC (Sweden): High-speed travelling-wave electro-absorption modulators.

Dave Payne, British Telecom (UK): Title to be given later.

Stéphane Bernabé, IntexyS SA (France), Advanced packaging concepts for low-cost optoelectronic devices.

See spie.org/events/eoc for additional speakers.