

EPIC NEWS

THE QUARTERLY EPIC NEWSLETTER FOR PHOTONICS

EDITORIAL

A New Star in the Laser Sky – the Fibre Laser

In the field of laser technology it may have seemed that things have stabilized over the past years. Although there have been improvements and further developments, extraordinary innovations have been missing in the marketplace. The development of high-power fibre lasers, indeed, has led to a quantum leap. Fibre lasers open a variety of new possibilities, which can be characterized by the terms: faster, better and less expensive.

There are new industrial fibre laser systems available on the market, which distinguish themselves – by having a power of 1 to 2 kW - by a beam quality that is diffraction-limited. Such systems are clearly destined for remote welding or remote cutting. In the power range up to 4 kW, the beam quality of the fibre lasers is two to ten times better than that of comparable Nd:YAG laser systems. There are no similar laser systems available on the market in the power range of 5 to 20 kW. With a life-time of the pump diodes of 50,000 hours these lasers are quasi-free of maintenance, their degree of efficiency is higher and their dimensions and costs are lower than those of comparable systems.

All of this demonstrates the enormous potential of high power fibre lasers in materials processing. To benefit from the full promise of this potential, some problems have to be solved. For example, additional plasma phenomena have been noted because of the higher beam power densities. Furthermore, there is a stronger optical feedback based on the very high degree of out-coupling of fibre lasers. These optical back reflections lead to laser beam spiking. However, negative effects on the laser processes have not been noted so far.

In summary it is obvious that fibre lasers are well suited for all standard laser processing applications. The high laser beam quality and the corresponding remarkable depth of focus allow a long working distance between the laser and the workpiece. This configuration enables flying-spot welding and cutting by using diffraction optics to steer the beam rapidly and gracefully from one location to the next. This development of “processing-on-the-fly” leads to dramatic reductions in both processing time and maintenance time, producing significant cost reductions for the user. The added flexibility and lower cost of this technology have been drivers for its adoption by the automotive industry. Many new applications are being investigated, and it seems to me that the potential for this new technology is quite promising.

On November 22, the day before the EPIC-/SPIE-Workshop on Laser Applications in Europe, a Fibre Laser Workshop will take place at Fraunhofer IWS in Dresden, Germany, where the latest results of a variety of applications of this new technology will be presented. EPIC members are welcome and encouraged to register and to attend.

By Eckhard Beyer, Eckhard.Beyer@iws.fraunhofer.de
www.iws.fraunhofer.de/workshop/e_workshop.html



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European Photonics Industry Consortium

ACCORD: Advanced Components Cooperative for Optoelectronics Research and Development

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EPIC has organised and submitted a proposal to the European Commission for the 5th and final photonics call for Framework Programme 6. The project, named ACCORD, will create a network between manufacturers of components and systems on one hand and universities and research laboratories on the other. The ACCORD programme will implement this exchange by purchasing components from participating companies and lending them to qualified R&D teams.

The proposal responds to a specific line-item in the Commission's work programme concerning initiatives for access to advanced components. The overall budget requested is approximately 1 Million Euros, which will fund

about 10 exchanges between industry and universities. The objectives of the programme are to demonstrate the value of the exchange, and to develop a self-sustaining model for continuation of the initiative when FP-6 expires. Eight partners joined in the ACCORD proposal: **EPIC**, **IMEC** (Belgium), **Haute-Ecole ARC** (Switzerland), **Perfos** (France), Multitel (Belgium), **SAGEM** (France), Scottish Optoelectronics Association (UK), **Wroclaw University of Technology** (Poland). Participants noted in bold are also EPIC members.

The project is now undergoing review by the Commission. If recommended for funding, it will start in June 2006.

CrystalQ is a Rising Star in the Deloitte Technology Fast 50 Competition 2005

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CrystalQ B.V., European supplier of superior quality sapphire substrates and sapphire wafer reclaim services for the LED industry, has won this year's Rising Star award in the Deloitte *Technology Fast 50* competition, which is part of Deloitte's *Technology Fast 50*: an annual ranking of the world's fastest-growing technology companies from each major region: North America, Europe and Asia Pacific.

Criteria for winning the Rising Star Award are that the participant develops a unique technology, which contributes significantly to the company's revenue. Products and services are technology driven and considerable effort is put into research and development of this technology.

According to the jury, the international position of CrystalQ and the immediate deployment of its technology and services to reduce the operational costs of its customers were decisive reasons for selecting CrystalQ as Rising Star 2005.



Dow Corning Increases Commitment to Photonics Solutions, Sets Sights on \$65-Billion Optoelectronics Market

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[Light Management group to commercialize company's photonics R&D innovations](#)

To address the needs of customers in the \$65-billion optoelectronics market, Dow Corning Corporation announced that its Photonics Solutions business development program will become part of the company's mainstream Electronics business. As a result of the move, the company will increase its sales, marketing and product development activities to support creation of light management applications for a vast range of markets, including automotive, displays and telecommunications.

"With 60 years of experience in silicon chemistry, Dow Corning understands like no other company the stringent demands placed on materials found in the lightpath and the advantages silicon-based materials bring to this challenge," said Tom Cook, global industry executive director, Dow Corning.



Photonics
Solutions

We help you invent the future.™

The Light Management group offers photonics products, services and technology solutions to meet optoelectronics customer needs. The initial focus of the group includes commercializing encapsulants and lenses for light-emitting diodes (LED) as well as materials for optical assemblies, fiber optics and light pipe/guidance applications. The group also provides a range of services, from optical waveguide prototyping and R&D contracting to total supply chain management solutions. Dow Corning also expects to develop optical interconnect and holographic material technologies.

According to the Optoelectronics Industry Development Association (OIDA), optoelectronics-enabled systems represented a \$223-billion market in 2004; of that, optoelectronic components accounted for \$65 billion, while optoelectronic materials represented a \$14-billion market.

EPIC Meets with the International Coalition of Opto-Electronics Associations

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EPIC presented its activities during the last year to the annual meeting of optoelectronics associations. The meeting took place the 22-23 September in Edinburgh, UK. The ten associations in the coalition are the Australian Photonics Forum, EPIC, The Hong Kong Photonics Association, KAPID from Korea, the OIDA from the U.S., the OITDA from Japan, Optech-Net from Germany, The Photonics Association of Singapore, the PIDA from Taiwan, and the Scottish Optoelectronics Association who were the host of the meeting. The meeting was highlighted by exchanges of market data and road-mapping activities. KAPID described the design and construction of a 3-kilometer LED demonstration park in Gwangju, Korea allowing the public to see and appreciate many different applications for high-brightness LEDs. The presentations will be available on CD-ROM shortly and will be distributed to members.

The meeting was an opportunity to meet with Michael Lebby, the new Executive Director of the OIDA, replacing Arpad Bergh who is retiring at the end of this year. We discussed a number of opportunities such as joint workshops where EPIC and the OIDA could collaborate.



Tom Pearsall, General Secretary of EPIC and Michael Lebby, Executive Director of the OIDA at the annual meeting of photonics associations in Edinburgh.

New EPIC Members: Welcome to JenOptik Diode Lab

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JenOptik Diode Lab GmbH, located in Berlin, was founded in February 2002 as a subsidiary of JenOptik AG.

The formation of the company was the result of a longstanding close cooperation between JenOptik and the Ferdinand-Braun-Institut für Höchstfrequenztechnik (FBH) in the field of high-power diode lasers.

JenOptik Laserdiode GmbH develops, produces and distributes high-power diode lasers. These innovative new lasers are used primarily as an activation source for solid-state lasers, and are also employed as direct laser sources in medical technology and materials processing.

Part of the JenOptik Group since 1993, JenOptik Laserdiode GmbH is a subsidiary of JenOptik Laser, Optik, Systeme GmbH within the Photonics business division of JENOPTIK AG, Jena, Germany.



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New EPIC Member: Welcome to BARCO n.v.

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Barco is a world leader in professional markets, in which it offers display and visualization solutions. Based upon in-depth market knowledge, the company designs and develops solutions for large screen visualization, display solutions for life-critical applications, and systems for visual inspection.

Currently, Barco is active in the markets of traffic, surveillance, broadcasting, presentation, simulation and virtual reality, edutainment, events, media, digital cinema, air traffic control, defence & security, medical imaging, avionics, and textiles.

Barco is headquartered in Belgium, and has its own facilities for Sales & Marketing, Customer Support, R&D and Manufacturing in Europe, North America and Asia Pacific. Worldwide, Barco employs more than 4200 people and realized sales close to euro 630 million in 2003.



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The quarterly EPIC newsletter for Photonics,
VOL 2, N°2 October 2005



Philips Acquires Controlling Stake in Lumileds

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Philips has gained a controlling 96% interest in Lumileds, a world leader in high-brightness LEDs (Light Emitting Diodes) for solid-state lighting. The deal underscores Philips' commitment to growing its lighting business and establishing a unique position in a technology that's set to transform the lighting market.

Solid-state lighting is seen as the biggest revolution in lighting technology since Edison invented the incandescent bulb. Although it's been a niche-market for general lighting markets in the past, the creation of white-light LEDs a few years ago has transformed its potential. Over time, solid-state lighting will revolutionize how we light our homes, our cars, our shops and our cities.

Unique capabilities

Created as a joint venture between Philips and Agilent Technologies in 1999, Lumileds was set up to pioneer everyday uses of solid-state lighting. Today, it produces LEDs for automotive lighting, computer displays, LCD TVs, signage and signaling and general lighting. In purchasing Agilent's 47% holding, Philips has extended its capabilities in LED lighting. It now has a unique position covering the full lighting value chain - from the semiconductor dies that form the basis of LEDs to complete solid-state lighting modules and systems.

Over the last 12 months (August 04 / July 05), Lumileds' sales increased approximately 28% to US\$ 324 million and the company earned an operating profit of US\$ 83 million during this period. Over the next few years, the market for high brightness LEDs is forecast to grow on average by approximately 25% per year. Lumileds expects to grow faster than the market and achieve average operating margins of approximately 25% in the coming years.



Figure 1: A world first with Equinox, Philips' LED architectural pedestrian lighting: Local council in Ede (The Netherlands) installs the lighting of the future.

Picogiga International and Veeco Instruments Partner to Advance Gallium Nitride (GaN)-on-Silicon Technology

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Picogiga International and Veeco Instruments have entered into a joint development program (JDP) designed to advance gallium nitride (GaN)-on-silicon technology to meet emerging market needs. Under the terms of the agreement, the two companies will team to create the first industrial MBE reactor optimized for use on Picogiga's patented GaN-on-silicon process. The initial work will take place in Veeco's Process Integration Center in Saint Paul, Minn. Upon completion, the new GEN200™ system will be delivered and installed at Picogiga's production facility in Les Ulis, France-enabling the company to produce up to 6-inch GaN-on-silicon epi wafers.

According to Jean-Luc Ledys, chief operating officer of Soitec's Picogiga division, the intent of this agreement is to pave the way for GaN-on-silicon substrates to become a competitive solution for wireless devices such as next-generation high-electron-mobility transistors (HEMTs).

"By accelerating the production ramp of high-quality GaN-on-silicon substrates, we can ensure that customers have access to the volume quantities needed to enable their emerging devices for wireless-infrastructure and other high-speed applications."



The Picogiga team (from left, to right): Hacene LAHRECHE: GaN project Manager, Laurent NAIM: R&D Engineer, Daniel DACRUZ: R&D Technician, Olivier BAGOT: R&D Technician, Julien THURET: Field Application Engineer, Philippe BOVE: R&D Director

TECHNOLOGY

JenOptik's Laser Diode Bars Break 400W Barrier

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JenOptik Laserdiode GmbH - a company of the JENOPTIK Group, announced on 22 August 2005 the fabrication of a laser diode bar that emits a record-breaking 454 W of continuous wave (CW) infrared (940 nm) light. JenOptik's result was achieved with a 1 cm long, 2 mm high bar that was made at its new semiconductor lab, JenOptik Diode Lab in Berlin that was created in February 2002 and is a spin-off from Ferdinand-Braun Institute in Berlin.

Detlev Wolff from JenOptik Laserdiode declared in an interview to the magazine *Opto and Laser Europe*: "It was just a plain vanilla semiconductor bar that we use in production - nothing special. Compared with the regular diode product we simply changed the packaging in order to carry the larger current." The water-cooled device emitted the record-breaking power when driven at a current of 580 A. According to Wolff, the result is important because it demonstrates that JenOptik's semiconductor material is



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capable of being driven at high output powers without suffering any catastrophic optical damage (COD) to its facets.

The highest power bars on the market currently deliver around 100–120W CW, and Wolff says that this figure is unlikely to rise for some time while manufacturers concentrate on improving the lifetime of devices rather than their

output power. "What we see right now is a race towards a new, commonly accepted power level. I think that this will probably be 120 W and this will stay for the next few years," Wolff explained. "Our industrial customers ideally want to have a seven-year lifetime [equivalent to 40000h] and we think that this is possible at 120W."

Photonics Technology Platform Clears the Last Hurdle before the Commission, Moves Closer to Reality

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Photonics-21 opens a door to new opportunities for the European photonics community

The European Commission has given the green light to the European photonic community to proceed toward an operational Photonics Technology Platform. EPIC is working in collaboration with the VDI to organise the Platform Launch on 1-2 December in Brussels. All EPIC members are urged to attend.

The current organisation scheme for the Platform is drawn from the strategic Vision document, Photonics for the 21st Century. The main technology areas are:

- Information, Communication
- Lighting and Displays
- Laser-Assisted Manufacturing and Quality
- Life Sciences and Health Care
- Safety and Security
- Education and Training.

The provisional name for the Platform is **Photonics-21**.

The establishment of the Photonics Technology Platform is a disruptive leap forward for the European Photonics Industry.

The Commission is convinced by our argument that photonics is more than an enabling technology, it is a technology that structures the course of research, development and commercial applications in strategic areas for Europe: Communications, Display, Lighting, Manufacturing, and Security. The Commission expects the Platform to propose research, development and applications programmes that will strengthen the competitive position of European technologies and industries. Beyond the programmes, the Commission also expects the platform to produce well-argued proposals for investment in European infrastructures to support European industrial leadership.

The Next Step:

The first direct action of the platform is to propose a strategic research agenda for FP-7. Partners in the Platform will be assigned to working groups on 2 December in order to develop this agenda which should be submitted to the Commission by mid-March 2006. This agenda describes the topics and priorities for Commission funding of R&D in FP-7. All EPIC members are encouraged to be present and to participate in this event.

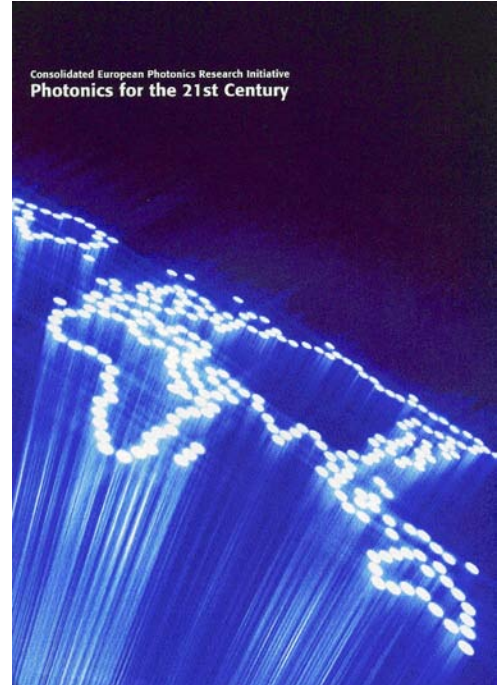
You can register for this important meeting on the EPIC Web site.

Covion-NOVALED Collaboration Sets a New Record for OLEDs

<http://www.merck-oled.de/>

Covion and NOVALED, world-wide leaders for high-power efficiency organic light emitting diodes (OLEDs), have developed a red top emission OLED achieving 10 lm/W at 500 cd/m² with a projected lifetime of more than 100,000 hours.

Organic light emitting diodes (OLEDs) that emit light away from the substrate (top emission type) are a key feature for future OLED applications. For displays, the top emission OLEDs increase the available light up to 50%. When used in lighting applications they make possible cheap non-transparent and flexible substrates.



Photonics for the 21st Century is the vision document that supports the creation of the Photonics Technology Platform: Photonics-21.

Novald has achieved the highest power efficiency together with the longest OLED lifetime for top emission OLEDs by using its optimised transport layer doping technology. The combination of a red phosphorescent emitter system from **Merck (Covion) OLED Materials GmbH** with the Novald molecular dopant materials and PIN structure resulted in a top emission OLED providing 10 lm/W with a projected lifetime of 100,000 hours at 500 cd/m². This power efficiency for the very deep red CIE colour coordinates (0.68/0.32) translates into 14 cd/A current efficiency and 3.0 Volt operating voltage. The lifetime measurement was carried out at a brightness of 3500

cd/m² in order to elevate the OLED ageing process. At this starting brightness, 8000 hours of continuous operation were determined.

Covion has changed its name to **Merck OLED Materials GmbH**. Based in Frankfurt, Merck is one of the leading manufacturers of materials for organic light emitting diodes. Covion Organic Semiconductors GmbH was formed in 1999 as spin out of the central research of Hoechst AG. In March 2005 Covion was acquired by Merck KGaA and integrated into the Liquid Crystal Division. Currently Merck OLED Materials has around 75 employees.

WORKSHOPS

Workshop on Universal Broadband Access Plays to a Full House at ECOC 2005

<http://conferences.iee.org/ecoc05/w2.htm>

The EPIC-organised workshop: **Universal Broadband Access: What role for photonics?** was characterised by strong attendance (150+) and enthusiastic audience participation. The workshop, presented on Sunday September 25 at the ECOC conference in Glasgow consisted of presentations of the requirements and a spectrum of technical solutions for broadband access, including fibre to the home.



Widely deployed broadband technologies, like ADSL and cable, deliver typically 10% of the communication rate that is advertised. Often the delivered broadband rate does not exceed 100kb/s for download and 20 kb/s for the upload.

Workshop Programme:

1. Market Issues: what is "broadband" what are the main access technologies? Where has FTTH succeeded? What is the size of the commercial opportunity? Will FTTH "resuscitate" the fiber optics industry in Europe?

Speaker: Reza TADAYONI, CTI - Technical University of Denmark, an EPIC member

2. "Prospects and timing for delivery of Video on Demand"

Speaker: Jean-Charles POINT, BREAD, France

3. Broadband access by powerlines: performance, cost, challenges, political/industrial support

Speaker: Klaus DOSTERT, University of Karlsruhe, Germany

4. Broadband access by radio / Radio over fibre: performance, cost, challenges, political/industrial support

Speaker: Shozo KOMAKI, Communication Engineering, Osaka University

5. MUSE Optical Access Technologies

Speaker and co-authors: Jeroen WELLEN Lucent Technologies, Gunnar Arvidson Acreo, Ton Koonen TU Eindhoven, Klaus-Dieter Langer, HHI Fraunhofer Gesellschaft, Stuart Walker, University of Essex

6. Broadband access by optics: performance, cost, challenges, political/industry support

Speaker: David B. PAYNE, BTextact Technologies

7. Synthesis: What does it mean to choose a lower-bandwidth solution for access? Can FTTH and ADSL / cable/ powerline access co-exist? Is there a smooth transition scenario between these technologies?

Speaker: Tove MADSEN, Kista Photonics Research Center, an EPIC member

8. Panel Discussion from leading players in the photonics industry in Europe.

Lars-Ulrik ANDERSSON, Deputy Director, COM-Technical University of Denmark, an EPIC member.

David DARBY, CTO, Northlight Optronics, an EPIC member

Gerlas van den HOVEN, Director, Genexis

Klaus SCHULZ, CTO, Merge Optics, an EPIC member

Pekko SIPILÄ, VP New Products, Modulight, an EPIC member.

The presentations emphasised a diversity of broadband solutions co-existing in the market space for some time to come. Broadband through the power line network is seen as a possible solution for distribution only inside a dwelling, competing with WiFi. The low performance of ADSL in comparison with advertised data rates will become worse as the number of clients grows. The panel concluded that fibre-to-the-home remains the most attractive opportunity for manufacturers of components and systems.

The programme has been edited, and the CD-ROM including all the presentations has been sent to all EPIC members.



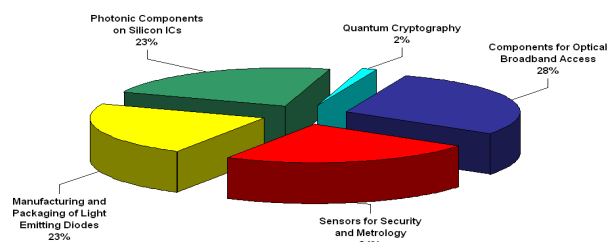
EPIC participants: David Darby, Northlight Optronics, Klaus Schultz, Merge Optics, Lars-Ulrik Andersson, Technical University of Denmark, Pekka Sipilä, Modulight, Reza Tadayoni, Technical University of Denmark, Tove Madsen, Kista Photonics Research Center.

Members Vote for Workshop Topics: Components for Broadband Access is the Favourite, a Three-Way Tie for Second Place.

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When voting closed on September 30, EPIC members indicated an almost equal preference for four out of the five topics on the ballot. Components for Broadband Access showed a slight advantage with 28% of the vote.

EPIC presented these results to the Governing Board at the quarterly meeting in October. Because of the additional responsibilities associated with a successful launch of the Photonics technology Platform, the Board decided to approve one workshop in 2006 on Optical Components from Broadband Access.



EPIC Plans Workshop on Laser-Assisted Manufacturing in Dresden 23-24 November, 2005

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

<http://spie.org/Conferences/Calls/05>



The Lasers and Laser Systems working group of EPIC is organising a workshop: Laser Applications in Europe, to be held at the Fraunhofer IWS laboratory in Dresden on 23-24 November. The EPIC workshop will be preceded by a workshop on Fibre Lasers on 22 November. Make your plans now to attend.

European companies occupy a dominant position in the world-wide industrial laser market, from basic research through commercial exploitation. The current global market size is about 3 billion euros. However, the market is not growing very rapidly.

The workshop will focus on the question: How can we make the market grow faster, and still keep market share?

Oral presentations will outline the principal opportunities and challenges, while posters will present solutions through technology and market opportunities. In addition, there will be a small equipment exposition on-site.

EPIC has contracted to produce a marketing report that integrates the data generated at this meeting. All EPIC members will receive a copy following the meeting.

Workshop Programme



Dresden, one of Europe's most beautiful cities, is also the site of two Fraunhofer Institutes, each specialised in photonics: Photonic Microsystems, and Material and Beam Technology

23rd November 2005

Speakers:

Introduction: T.P. Pearsall, EPIC		
Welcome: Prof. Dr. Eckhard Beyer, Fraunhofer Surface Technology and Photonics Alliance		
Rainer Zimmermann	EU Commission Directorate-General for Research	
Frank Palm	EADS - Metals Corporate Research Center Germany	
Arnold Mayer	Optech Consulting	Laser Markets in 2005
K. Löffler	Volkswagen	Lasers in Transportation
Mr. Paul Williams	Rolls Royce	Lasers in Transportation
Dr. Willem Hoving	Philips Applied Technologies	Lasers in Electronics Manufacturing
Rob Hartman	ASML	Lasers in Electronics Manufacturing
Markus Hüske	LPKF	Lasers in Electronics Manufacturing
Ulrich Hefter	Rofin Sinar	Lasers in the Graphics Industry and Marking
Dr. Guido Hennig	Daetwyler	Laser Engraving
Thomas Klein	ESKO graphics	Lasers in the Graphics Industry and Marking
Prof. Dr. H.-G. Löhmannsröben	Universität Potsdam	Lasers in Life Sciences and Health Care
Georg Korn	Femtotechnologies	Lasers in Life Sciences and Health Care
A. Siegel	Carl Zeiss Optronics	Lasers in Life Sciences and Health Care

24th November 2005

Session and Workgroups on:

Lasers in Transportation and Machinery
Lasers in Electronics Manufacturing / Nanotechnology
Lasers in the Graphics Industry, direct writing and Marking
Lasers in Life Sciences, Health Care and Biotechnology