

Laseroptics

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Newsletter - Laser Optics Berlin - December 2008 edition

Dear Reader,

Today we are sending you the newest edition of the Laser Optics Berlin newsletter, with the latest reports about the industry, networks, research & development. We wish you an enjoyable read.

Your Newsletter Editorial Staff

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Industry Report "Optical Technologies – Microsystems Technology in Berlin Brandenburg"

Strong revenue increase, a substantial number of new jobs and a still optimistic business outlook: This is the result of the Industry Report "Optical Technologies – Microsystems Technology (OT-MST) in Berlin-Brandenburg".

In 2007, the mostly small and medium-sized enterprises in the field of optical technologies and microsystems technologies achieved a total turnover of € 1.9 billion which



Medienkooperationen



equals an increase of more than 6 per cent compared to 2006. During this period, the number of employees rose by 5 per cent from 12,200 to 12,800.

"Looking at the years 2002 - 2007, the Industry Report underpins that over the past years, the fields of competence in Berlin were the growth engine in the region – optical technologies featuring strongly among them, besides biotechnology, medical technology, traffic systems technology as well as information and communication technology/media", Harald Wolf, the Berlin Senator of Commerce explained. "The optical technologies illustrate that the capital region is developing successfully as an industrial and innovation location."

The development of solar module production in Berlin-Brandenburg is very impressive. In 2007 the number of employees increased from 900 to 2,200. "This extension of production provides additional opportunities also for the OT-MST industry since optical technologies can be applied in processing, e.g. for the cutting of solar modules and for control functions", said Prof. Dr. Günther Tränkle, CoB of OpTecBB and Director of the Ferdinand-Braun-Institut für Höchstfrequenztechnik. The company also expects a positive business development in the next two years. 88 per cent of the companies interviewed from May to August this year expect further growth in sales and employment.

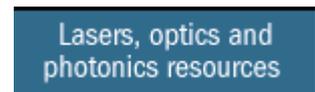
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More Precise Brain Surgery by Laser Beam

Within the joint MIRSURG research project (Mid-Infrared Solid-State Laser Systems for Minimally Invasive Surgery) the researchers of the Berlin-based Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy (MBI) are trying to develop a laser which enables minimally invasive brain surgery. The laser will have a very high pulse energy and a high medium performance and a wavelength of 6.45 micrometers.

Earlier tests carried out in the USA with free electron lasers (FELs) have proved that brain surgery performed at a wavelength of 6.45 micrometers leads to good results. Such lasers are synchrotron radiation sources which generate a coherent radiation with a very high brilliancy. They can be adjusted to any desired wavelength. The operations were conducted at the FEL measuring stations especially installed for this purpose. For routine surgery, however, FELs are not practical since they are coupled to big and far more expensive particle accelerators. These do not provide reliable radiation at all times due to outages and repair time; furthermore, there are no standards for intensive care.

Within a consortium consisting of five European research institutions and four companies, MBI researchers under the leadership of Dr. Valentin Petrov are now trying to develop so-called table-top lasers, i. e. devices which can be placed on a table, that are practical for routine utilisation in neurosurgery. The table-top laser is a solid-state laser which emits light of a wavelength of 1 or 2 micrometers. The wavelength is then transformed into medium IR by so-called optical-parametric oscillators based on crystals in which non-linear optical processes are performed. A particular challenge for the researchers is the implementation of the specific time



structure which leads to the desired effect by means of a robust and reliable "all-solid-state" laser technology.

The three-year project is funded by the 7th Framework Programme (Information and Communication Technologies) with € 2.8 million; the total budget of the project is € 3.9 million. "Within this period of time, we intend to show the technological feasibility. A follow-up project for the development of appliances and for clinical studies within the Health Programme would then be necessary," Petrov added. If the researchers succeeded in establishing the technology, Petrov sees even more applications for such lasers within the medium IR in medicine, but also in the fields of safety, environment and nanotechnology.

Contact:

Dr. Valentin Petrov, phone: 030 6392 1281, e-mail:

petrov@mbi-berlin.de

www.mirsurg.eu

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Ten Years ago the Synchrotron Radiation Source BESSY II was Put into Operation

On 4 September 1998, the former Research Minister Jürgen Rüttgers, the Governing Mayor of Berlin, Eberhard Diepgen and the two Managing Directors of BESSY GmbH, Eberhard Jaeschke and Wolfgang Gudat, inaugurated the world's cutting-edge synchrotron radiation source at that time.

"BESSY II was to become a core for the new science location Berlin Adlershof", Hermann Schunck, a former member of the supervisory board of BESSY, recalls the planning phase. A strategy which has proved successful.

Today, more than 1,300 users from Germany and abroad do research at the electronic storage ring in interdisciplinary projects within the fields of physics, chemistry, biology and materials sciences. BESSY has numerous cooperations at the Adlershof Campus which benefit from being so close to each other. The Physikalisch-Technische Bundesanstalt (PTB) and a total of four institutes of the Max-Planck-Gesellschaft have their own test sites at BESSY.

The high quality of the radiation generated at BESSY II provides excellent experimenting conditions for cutting-edge research and industrial applications. The efficient synchrotron radiation source of the third generation was developed and planned as a successor of BESSY I in Berlin Wilmersdorf, being the first dedicated synchrotron radiation source of Germany. In 1993 the construction of the new ring started in Adlershof in parallel to the operation of BESSY I.

Ten years ago another foundation stone was laid as well. BESSY and the Hahn-Meitner Institute signed a cooperation contract on setting up a complete institute department at Adlershof aimed at using the radiation of BESSY II for solar energy research. The cooperation turned into a joint venture. Starting in 2009, the new "Helmholtz-Zentrum Berlin für Materialien und Energie" will contribute to solving big and urgent issues arising in society, science and industry.

www.bessy.de

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Optical Technology for the Delivery of Large Electronic Data Volumes

Routers are electronic parcel services. They bundle data, make them ready for delivery and transmit them. Researchers of the Karlsruher Institut für Technologie (KIT) and their partners are developing a new generation of these devices within the EU TRIUMPH project: "Our router manages the data volumes of entire cities", says Professor Jürg Leuthold from the Institute of Photonics and Quantum Electronics. The trick of the scientists: Their router controls the optical data signals with the help of light pulses.

In mid August, the scientists put into operation one of the first and fastest fully-optical routers of the world in the lab of the institute. The router is not controlled by electronic control signals as usual, but with light – "more quickly than electronics could ever do this", says Leuthold. When started, the router was equipped with all new components built by eight groups of researchers in Europe in the last two and a half years: Lasers, modulators, chips and new specially developed individual components. They are connected via about ten kilometres of fibre cable.

The project is managed by Jürg Leuthold and his team from the University of Karlsruhe. In his opinion, the results confirm that optics enters new areas "that cannot even be reached by high-speed electronics". According to Leuthold, "the new router is controlled and synchronized on the basis of optical data only and links 40 gigabit and 130 gigabit networks". Leuthold explains the speed of the optical switches by giving an example: The router developed under the project may accommodate data transfer via the internet and phone on the global data highway and disseminate the data transferred at a rate of 130 gigabits per second to the cities of Frankfurt, Karlsruhe, and Stuttgart. "Each city would receive its parcel of 43 gigabit per second", says Leuthold. Vice versa, the router can bundle the data of the three cities to a single high-speed signal of 130 gigabit per second. For this purpose, it first synchronises the data of the three cities to the same speed and the same optical signal wavelength.

For further information please visit:

www.kit.edu

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Laser Beam Dispersed Cutting Tools at the Laser Zentrum Hannover

The properties of cutting tools can be significantly enhanced by integrating hard ceramic particles into the base material. This can be realised by means of laser technology. According to the current state of development, laser beam dispersed cutting tools are exceeding the wear characteristics and service lives of conventionally manufactured tools.

Lightweight construction is gaining more and more importance especially in the automotive industry. Against the background of expensive resources, increasing environmental pollution and the resulting energy savings, sheets made of lightweight materials such as aluminium alloys and high-strength steel tools are increasingly used. The cutting of these materials with

conventional tools, however, involves a higher tool wear, thus reducing the tool life quantity and service life. Besides the increasing costs for tools, the number of tool changes and the respectively related production downtimes increase.

For this reason, the research project at the Laser Zentrum Hannover e.V. (LZH) was aimed at enhancing the properties of cutting tools. The approach of this project was the integration of hard ceramic particles (ZrO₂) into the tool base material by means of laser beam dispersing. The dispersing with an Nd:YAG laser could avoid the dissolution of the hard material and achieved a homogeneous distribution of the ceramic particles. According to the current state of development, laser beam dispersed cutting tools are exceeding the wear characteristics and service lives of conventionally manufactured tools. The results of the wear analyses furthermore show that the stability of the cutting tools could be further enhanced by increasing the hardness of the base material.

The project supported by the AIF via the Europäische Forschungsgesellschaft für Blechverarbeitung e.V. (EFB) was carried out in cooperation with the Chair in Conversion and Primary Shaping Technology of the Technical University of Dresden.

Contact: Laser Zentrum Hannover e.V. (LZH), Michael Botts, Hollerithallee 8, D-30419 Hanover, phone: +49 511 2788-151, e-mail: m.botts@lzh.de
www.lzh.de

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Application Centre for Optical Polymer Fibre in the "Country of Ideas"

In early November, the Anwendungszentrum für Optische Polymerfasern (POF-AC) of Georg-Simon-Ohm-Hochschule Nuremberg was awarded with the prize of the initiative "365 places in the country of ideas", which is carried out jointly by the Standortinitiative "Deutschland - Land der Ideen" [location initiative "Germany — Country of Ideas] and Deutsche Bank. POF-AC is Europe's first Anwendungszentrum für Optische Polymerfasern [Application Centre for Optical Polymer Fibres] and is directed by professors Dr. Hans Poisel and Dr. Olaf Ziemann of the Faculty for Electrotechnology / Fine Mechanics / Information Technology (efi). POF are light conductors made of plastic which are much more flexible than comparable data cables made of copper. Moreover, they can transport more data, are bug-proof, are electro-magnetically not interference-prone and can be installed easily.

POF-AC is presently developing the "Sollector", i. e. energy-saving lighting with natural light. The system collects direct sunlight, couples it into light conductors and thus enables the transport of light into interior rooms, however, avoiding problems such as the heating up of the room by heat radiation or the glare by the sun shining in from a low angle.

POF-AC has developed most of its ideas during the past years for the optical data transfer at short distances, above all for applications in the car, between fast electronic components and also at home. Whereas only a few years ago, POF considered a data rate of 1 gigabit per second a utopia, the POF-AC scientists have developed an outstandingly attractive, since easy and low-cost solution for it within the European

project "POF-ALL" in cooperation with its partners from Italy and Holland, and above all with the Fraunhofer IIS in Tennenlohe. This development would e.g. enable the download of a complete movie from a server within 40 seconds. This would take more than half an hour with the presently common ADS Internet access.

For further information please visit:
www.ohm-hochschule.de

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Science Prize awarded for Theses on Orthokeratology

The graduates Christin Kuhlmann and Judith Zagolla (of the Study Course Ophthalmic Optics/Optomety) were awarded the Rupp+Hubrach Prize for Ophthalmic Optics 2008 in early November for their thesis at the University of Applied Sciences of Berlin (TFH) on the issue of Orthokeratology. The paper is embedded into the TFH research project Ortho-K, which was established in 2003 and which has so far brought about eight theses built on each other.

Orthokeratology is a procedure of gently reshaping the cornea by fitting a special hard contact lens which is worn overnight with the result that no correction is needed on the following day. This method is completely reversible in contrast to refractive surgery – the cornea redevelops its original shape as soon as the lenses are not worn any more.

The eyeglass specialist Rupp+Hubrach from Bamberg awards an annual science prize for the best German thesis in the field of ophthalmology/optometry. The jury consists of representatives from industry and the media of the German ophthalmology besides university lecturers. The thesis presently awarded with the science prize enhanced the instable fit of rotation symmetric lenses on toric corneae by using peripherally toric lenses for the first time. This meant a break-through for acceptance.

Contact: Head of School Prof. Dr. Peter Moest, e-mail:
pmoest@tfh-berlin.de, phone: 030-4504-4710
For further information please visit:
www.rh-brillenglas.de

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Second Round in the Competition on "Energy Efficient City Lighting"

The Federal competition "Energy Efficient City Lighting" launched in June is entering the second round. The competition of the Federal Environmental Agency (UBA), the Federal Environment Ministry (BMU) and KfW-Bankengruppe especially addresses the municipalities and looks for concepts for an energy-efficient reshaping of city and municipality lighting.

Only the energy consumption for the lighting of roads and squares in Germany equals the energy consumption of approx. 1.2 million households and leads to a carbon dioxide emission of more than two million tonnes per year. The energy consumption could be halved with the available technology. The municipalities could thus save a lot of money.

The first part addressed the providers of the lighting technology. As a result, information about available, energy-efficient and climate-friendly technologies is available for city lighting which can be downloaded on the Internet.

The kick-off for the second part was on 27 October. "The information does not only help the municipalities. They will definitely trigger an efficiency competition among the manufacturers and providers of the lighting technology", said UBA Vice President Dr. Thomas Holzmann. The cities and municipalities are now invited to submit innovative concepts for the renewal of their city lighting by the end of February 2009. The municipalities with the best concepts will be awarded with a prize and can obtain an investment grant from the environmental innovation programme of the BMU for its implementation. Also the other participants of the municipality competition will benefit from it since a modernisation of the city lighting will pay off because it will ease the burden on the budget of the cities and municipalities as well as on the environment.

The information gathered on technologies is published under www.umweltbundesamt.de

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www.bundswettbewerb-stadtbeleuchtung.de

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