

# Newsletter

Advanced Solutions for Optics, Opto-Electronics, Lithography and Science!

**SCHOTT**  
glass made of ideas

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## TECHNICAL INFORMATION & PRODUCT NEWS

SCHOTT expands its coating capabilities: new magnetron sputtering machine is running

SCHOTT offers New One-Stop Shop for Anti-Reflective and Highly-Reflective Optical Components in Duryea, PA, USA

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## UPCOMING SCHOTT EVENTS

## Page **SCHOTT expands its coating capabilities: new magnetron sputtering machine is running**

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In March 2011 SCHOTT introduced its new magnetron sputtering machine during a customer event with more than 30 participants from industry and science in Yverdon/Switzerland.

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With this new technology SCHOTT expands its capability regarding coatings and strengthens its competence center in Yverdon with more than 17 different

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coating machines. Now notch filters, ultra hard anti-reflex coatings, and steep edge filters (band-, short-, and long-pass filters), used in Raman spectroscopy or fluorescence microscopy, can be offered according to customer needs. Dimensions up to 200 mm in diameter and up to 60 mm in thickness can be now coated with this magnetron machine.

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Source: Leybold Optics, Printed with permission

### VISIT US AT:

**LASER. World of Photonics.**

**May 23rd – 26th, 2011**

**München**

**Hall 2, Booth 308**

**“SCHOTT. Your Partner for  
Excellence in Optics”**

## SCHOTT offers New One-Stop Shop for Anti-Reflective and Highly-Reflective Optical Components in Duryea, PA, USA

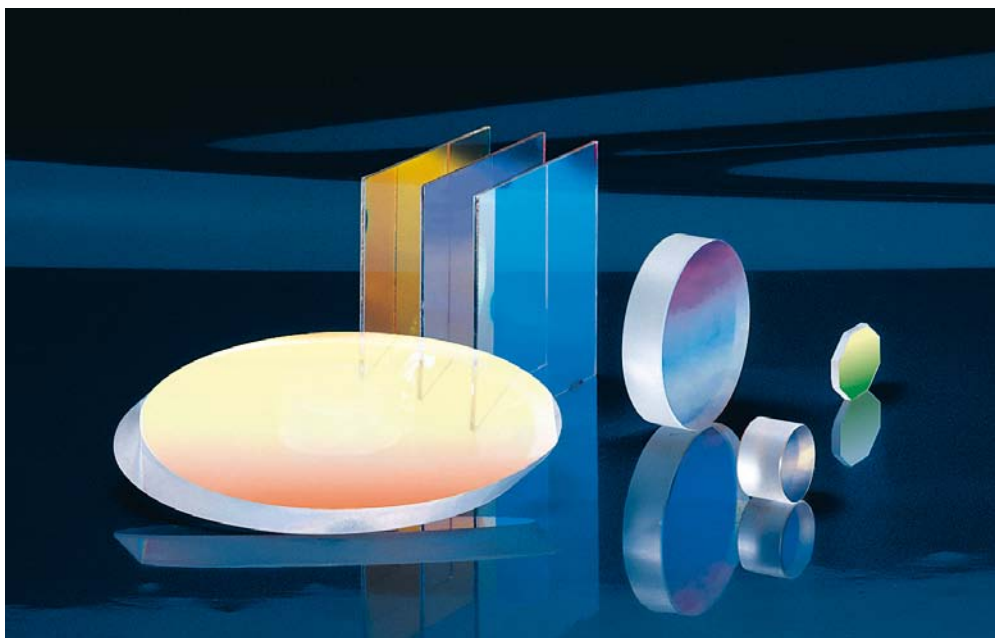
SCHOTT's expanded optical coatings facility at its manufacturing site in Duryea, Pennsylvania houses chambers for anti-reflective (AR) and highly-reflective (HR) coatings of polished filters and components up to 14 square inches or 18-inch diameter in size. Coatings are available for the visible and near infrared spectrum. With this investment SCHOTT expands its coating capabilities and can now offer enhanced solutions for industries such as defense, medical and analytics. The facility spans more than 2,000 square feet and contains chambers of different sizes to meet customers' requirements. Using e-beam and ion-assisted e-beam evaporation technologies, coated components meet the reflection and environmental specifications set by the International Organization for Standardization (ISO), American National Standards Institute (ANSI), and the military (e.g. MIL-C-675C, MIL-C-14806A).

By manufacturing coated components in house, SCHOTT simplifies and expedites

the procurement process for customers who previously needed to purchase polished components from SCHOTT and then coat them at a third party. "SCHOTT wants to give our customers peace of mind by creating a one-stop shop for high-quality coated optical components," explains Dr. Angela Hohl-AbiChedid, Business Development Manager for SCHOTT Advanced Optics. "After investing in our Duryea facility, we can now coat our polished substrates in house. Using more than 125 years of optical glass expertise, SCHOTT has developed manufacturing processes that guarantee our customers not just industry-leading glass but top-quality polished and coated components as well."

SCHOTT's new coating line in the United States adds to the company's global coating capabilities. SCHOTT also has coating lines at its Switzerland and Malaysia sites.

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*Coatings as important competence of Advanced Optics*

## Updated Product Information

### RECENT UPDATES:

We have updated the following product information:

- **Pocket Catalog: Optical Glass**
- **ZERODUR® Catalog**
- **More than 50 product flyers**

Contact us for your request!  
[info.optics@us.schott.com](mailto:info.optics@us.schott.com)

## Global market for lasers shows a steady but sustained growth SCHOTT puts itself into place to fulfil market needs and expands its production capacity for Aspheres

After the deepest recession that the laser materials processing sector had ever experienced in 2009, it showed a remarkable growth of 27% in 2010. Thanks mainly to a sustained recovery of materials processing and communications applications, the global market for lasers is expected to experience a robust growth in 2011 and also into 2012.

Aspheres are a high end product being needed for various laser applications. In order to be aligned to the market developments and to fulfil customer's requests, SCHOTT put strong emphasis on that topic and has expanded its capacity for CNC-asphere production.

SCHOTT is specialized in producing and processing aspheres made of optical glass or fused silica with the Magneto Rheological Finishing (MRF) technology. The utilized process is particularly suited for small to medium series of lenses with diameters between 10–200 mm for laser applications. Thanks to the excellent product quality and reliability, aspheres from SCHOTT are often the component of choice and an increased demand for this product is experienced. In order to serve the market, SCHOTT has bought a new MRF machine, thereby increasing its capacity for CNC-asphere production to deliver higher quantity of lenses to existing and new customers.



*CNC machined Asphere from SCHOTT*

If you want to have further information about our capabilities including SCHOTT's precision molding, please go to the website: [http://www.us.schott.com/advanced\\_optics/english/our\\_products/process\\_components/lenses/index.html](http://www.us.schott.com/advanced_optics/english/our_products/process_components/lenses/index.html) or contact us: [info.optics@us.schott.com](mailto:info.optics@us.schott.com).

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## Innovation Workshop on Coating in Yverdon

On March 15th SCHOTT Advanced Optics invited its customers to Yverdon to be part of an Innovation Workshop focusing on coatings.

The establishment of the competence center "coatings" and the installation of a new magnetron sputtering tool were reason enough to hold such an event and to give the customers and partners the opportunity to explore the capabilities, to discuss new developments, and also to address their requirements.

After an opening dinner, a day full of technical presentations followed. All presentations focussing on products of Advanced Optics, its processing capabilities and sputtering equipment were highly specialized and technical in content. In addition, external experts from the Fraunhofer Institut in Braunschweig and the EADS Astrium spoke



*Interested attendees of the Innovation Workshop in Yverdon*

about "Trends in Optical Coating in General" and "Trends & Requirements for Coating Applications in Space."

In addition to the theoretical part of the event, all attendees had the chance to tour the facility and to actually see all the equipment including the new sputtering tool. The application managers and processing experts were available for discussions and answered all the questions. A question & answer session ended the Innovation Workshop.

SCHOTT Advanced Optics sees itself as the Partner for Excellence in Optics and is a valuable partner for its customers to develop joint products and offer custom solutions. Events such as this workshop are part of this approach and the outcome of the workshop held on March 15th encourages us to continue our activities in this field.

Workshops can be held at a SCHOTT facility, we can visit your site and address a topic of interest, or visit us at one of our numerous presentations held at various conferences or universities in the field of optics – we are looking forward to seeing you and being your Partner for Excellence in Optics.

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## Publications proof Technical Competence

As "Your Partner for Excellence in Optics" we do not only hold workshops and technical sessions to get in close contact with our customers and partners – we also contribute to the technical community with various publications.

Here you find a short extract of the main papers published last year. If you are interested in details, please go to the respective publisher and download or request the documents.

- Optical glass and glass ceramic - historical aspects and recent developments: a SCHOTT view; OSA; Applied Optics, Vol. 49, No. 16
- Modeling of the thermal expansion behavior of ZERODUR® at arbitrary temperature profiles; SPIE, Proc. 7739
- Flat hat glass diffractive optical beam shaper in Laser Resonators and Beam Control, XI; SPIE, Proc. 7194
- Glass Diffractive Optical Beam Shaper for Laser Applications; DGaO Proceedings 2009, ISSN: 1614-8436

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## SCHOTT's contribution to Technical Sessions at SPIE Optics & Photonics, San Diego, California

SPIE Optics & Photonics is one of the largest inter-disciplinary technical conferences in North America presenting and discussing the latest research and technologies in solar, nano, optics, photonics, and space optics. Here you find short synopses of the sessions of our experts which will be held at the conference.

### ZERODUR® for stress mirror polishing

*Ralf Jedamzik, Clemens Kunisch,  
Thomas Westerhoff*

Stress mirror polishing is being considered for the generation of the aspherical shaped primary mirror segments of the thirty meter telescope (TMT). For stress mirror polishing it is essential to precisely know the elastic response of glass ceramic substrate materials under a given deformation load. In the past it was experimentally shown that glass ceramics do not respond instantaneously to loading and unloading conditions, this effect was called "delayed elasticity".

Recently it was proven that it is possible to use a model to predict the characteristic thermal expansion behavior of individual ZERODUR® batches for a given temperature profile. A similar approach will be used to predict the elastic behavior of ZERODUR® under time dependent loads.

In this presentation the delayed elasticity effect of ZERODUR® is reviewed. The elastic response of the material to load conditions is shown and discussed. First results of a model approach based on experimental results and tools that have been built up for the modeling of the thermal structural relaxation effect of ZERODUR® will be presented.

### Design and fabrication of a 3 m class light weighted mirror blank for the E-ELT M5

*Ralf Jedamzik, Volker Seibert,  
Armin Thomas, Thomas Westerhoff  
Michael Müller, Marc Cayrel*

Recently, SCHOTT has proven its capability for the manufacturing of large light weighted ZERODUR® mirror blanks for telescope projects, for example, the GREGOR solar-telescope. In 2010 SCHOTT was awarded with a study to develop a design for the M5 mirror blank of the ESO E-ELT.

The tip and tilt M5 mirror of the European Extremely Large Telescope (E-ELT) requires a demanding approach in light weighting. The approximately 3 m x 2.5 m elliptical plano mirror is specified to a weight of less than 500 kg with high Eigenfrequencies and low deformation under different inclination angles.

The study was divided into two parts. The first part targeted on an optimized lightweighted design with respect to performance and process ability with the help of finite element modeling. In the second part of the study a concept for the processing sequence including melting, cold-processing, acid etching and handling of the M5 blank was developed. With the fabrication of a prototype section SCHOTT demonstrated its capability to manufacture the demanding features including pockets with 350 mm depth, thin walls and sloped pocket bottoms.

This presentation shows the results of the design work, processing concept and demonstrator fabrication.

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### Progress on 4 m class ZERODUR® mirror production

*Thomas Westerhoff, Ralf Jedamzik,  
Alexander Werz, Thomas Werner,  
Steffen Gruen, Christopher Klein*

The first monolithic ZERODUR® 4 m class mirror was ordered by the German Max Planck Institute for Astronomical Physics in 1968. The technological ability to actively compensate the bending of the mirror substrate under gravity initiated the development from heavy non active thick mirror substrates to thinner thicknesses starting with the NTT, the New Technology Telescope of ESO.

In this presentation we will present results on material properties achieved for the 4 m class mirror substrates recently delivered by SCHOTT. The CTE homogeneity, the internal quality regarding striae, bubbles and inclusions as well as stress birefringence data are reported.

### ZERODUR®: New Results on Bending Strength and Stress Corrosion

*Peter Hartmann*

ZERODUR® strength data and information are required for the design of structures, which will be subject to mechanical loads throughout their lifetime or at least during some periods thereof such as lightweight mirrors for space telescopes. Comparison of data acquired twenty years ago with recent ones show astonishing reproducibility. An influence of the specimen preparation process on the width of the breakage stress distribution generally leading to higher values has been observed.

New data are available for diamond grain D25 fine ground surface condition. The stress corrosion coefficient, an important parameter needed to calculate the long time behavior of structures subject to tensile stress in their surface has been determined from breakage data sets obtained with different stress load increase rates.

Conditioning of ZERODUR® specimen with stress free storage under varying humidity and humidity exposure times has shown no influence on strength.

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## Upcoming SCHOTT Events

*Here we are listing the events where "Advanced Optics" proactively attends as an exhibitor, speaker or has an active part such as "chair of technical conferences," etc.*

LASER. World of Photonics. 2011. May 23rd – 26th  
Neue Messe München, Germany  
Hall 2, Booth 308

Sensor + Test 2011, June 7th – 9th  
Nuremberg, Germany  
Booth H12-337

Nanotech Conference & Expo 2011, June 13th – 16th  
Boston, MA., USA

Opto Taiwan 2011, June 14th – 16th  
TWTC Nangang Exhibition Hall  
Taipeh, Taiwan

112. DGaO -Tagung 2011, June 14th – 18th  
Ilmenau, Germany

SPIE Optics & Photonics 2011, August 23rd – 25th  
San Diego, CA., USA

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