Vol. IV, No. 3, October 2009

TECHNICAL INFORMATION & PRODUCT NEWS

VOICE OF THE CUSTOMER & INDUSTRY TRENDS

REGIONAL & CLOSE UP

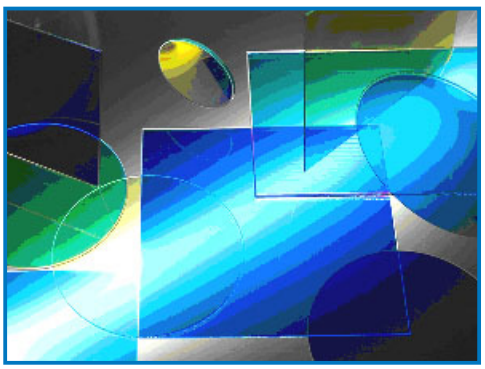
SCHOTT expands its coating capabilities in order to increase its competences as supplier of high precision optical components

Sputtering tool enables the application of large dimensioned surfaces

A mid-frequency magnetron sputtering system enables the coating of large format glass parts, which are facing increasing demand in aviation, industrial sensor technology and medicine.

Metal or dielectric materials can now be deposited on glass substrates in geometries up to 590 mm x 730 mm applying layers of protective, anti-reflective, metallic, or transparent conductive (containing indium tin oxide) coatings, being extremely dense and hard. Thus, customized coatings are offered for applications like scratch resistant and anti-reflective instrument displays for aviation and large protected glass substrates for manufacturing microarrays in industrial sensor and medical technology.

Besides these enhanced coating technologies, Advanced Optics offers a large portfolio of optical glass filters that spans more than 50 filters made of colored glass, a wide variety of customer-specific interference filters and special filters such as contrast enhancement filters offering solutions for specific applications. Advanced Optics will strengthen its components business and further expand its competencies in this field.



Optical filters from SCHOTT made of monolithic color glass or interference coatings

Establishment of one Center of Excellence for Components and Coatings in Europe

In order to enrich the competencies in the production of high precision components, a center of excellence for thin film coating technology will be established. The goal is to bundle experiences and high coating technology equipment and to benefit from synergies and knowledge transfer. Consequently, the coating capabilities will be concentrated in Yverdon, Switzerland and the respective sources from Intervac Mainz will be transferred by the middle of 2010. In parallel, SCHOTT will invest in a new sputtering tool with further filter coating capabilities to offer demanding interference filter solutions to applications, such as Bio-Analytic, underlining the commitment for its product range of components. Additionally, the application team will provide technical support to develop customized filter solutions.

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Updated Filter Catalogue

With SCHOTT's concentration and focus on the components business, an updated Optical Filter Glass catalogue is available (PDF). The reworked version contains new information on blue filter S8612 for IR-cut applications, as well as specifications on NVIS compatible filters such as S8022 and S8023. For these filters, the chromaticity and NVIS radiance values are listed for different LED sources. This data is available upon request for further light sources.

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New glass rods with very promising market response

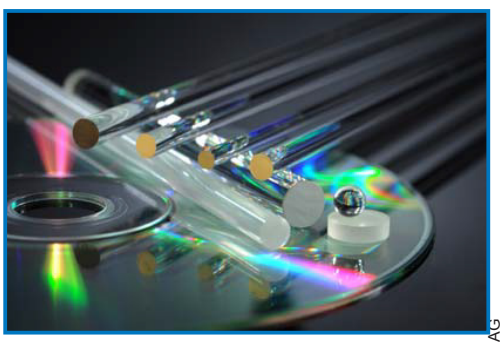
New developed glass rods experience large attention in the market and open new perspectives for processes and products

The new glass rods introduced in the last newsletter Vol. IV, No. 2 have now been successfully introduced to the market. After first discussions with partners and customers it can be concluded that the new rods open up new perspectives and opportunities for the market, but also for SCHOTT in terms of products and processes. "The feedback on our rods with their new dimensions and reliable quality has been very positive and promising as our customers identified the potential for time and cost savings in their processes right away. Thus it shows on the one hand that we have developed a promising addition to our product portfolio in terms of rods; on the other hand it also proves that we are focusing on the right development of our glass portfolio to continuously extend our variety of Low Tg glasses. Both initiatives will enable our customers to significantly benefit from the extension of our portfolio," states Marko Ludwig, Sales Manager from Advanced Optics after presenting the rods to various customers.

The new offered dimensions, aside from the standard measure, allow a new definition of successive processes and the smaller diameter allow for a better proximity to the near net shape of successive product forms, thus opening up new opportunities for our partners. Besides the new variety of rods, a close application and development support with the goal to provide solutions for our customers' requests can be offered. Joint development initiatives in terms of delivery forms and shapes are possible and appreciated.

With the launch of the new rods, SCHOTT now offers the widest range of rods in terms of diameters, lengths & materials and should be recognized as one of the most comprehensive suppliers. Rods with diameters down to 1 mm and lengths up to 1000 mm offered in different materials (various low Tg glasses, different optical glass types) are available and due to different process capabilities nearly all customer requirements can be fulfilled. In addition, SCHOTT underlines its responsibility in terms of resource saving production processes & environmental protection.

If you want to learn more about our portfolio and rods, please contact us at info.optics@schott.com.



Optical glass rods as base for ball lenses or other miniaturized optical components

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SCHOTT 125 YEARS

Aspherical Lenses in new dimensions and materials

Expansion of portfolio of molded aspherical lenses in proven quality

SCHOTT Advanced Optics has expanded its portfolio on molded aspherical lenses to an extended lens diameter range from 1.5 mm up to 40 mm. All aspherical lenses will continue to be available in proven surface quality and form error. Besides the known lenses made of the already available materials, SCHOTT now offers aspheres in newly developed low Tg glasses such as N-KZFS4 or SF57 which were added to SCHOTT's wide product range of optical glass earlier this year. This expansion has already been announced in the last newsletter, Vol. IV, No. 2. A new datasheet containing these additional options is posted on our website www.schott.com/advanced_optics or can be sent to you directly by mailing your request to: info.optics@schott.com.

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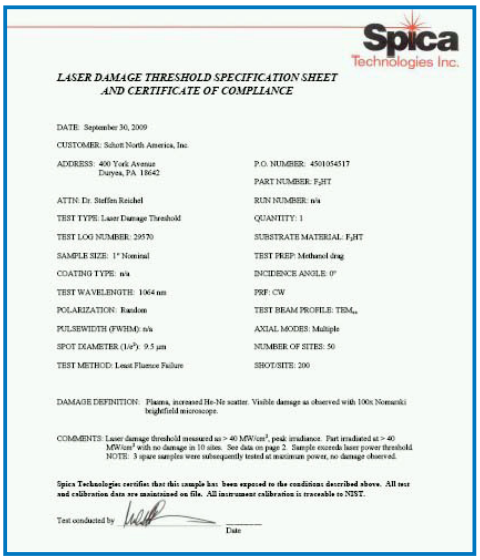
SCHOTT Optical Glass F2HT for high power laser applications

F2HT receives quality certification after confirming its quality through withstanding more than 40 MW/cm² CW laser light at 1064 nm

Many laser applications use high power laser light at 1060 nm wavelength. The laser beam must often be shaped with lenses. Therefore the lens material and its coating must withstand high laser power. F2HT, an optical glass with very high transmission from SCHOTT has now been proven to be suitable for these applications. An external test lab has recently tested the glass F2HT through applying continuous laser shots to the glass with a certain strength and a certain frequency. Even though the glass was exposed to very heavy laser light, F2HT could not be damaged. The glass F2HT is now certified to withstand a continuous wave laser radiation of more than 40 MW/cm² at 1064 nm wavelength. In addition to this certification, F2HT has a refractive index of n_d = 1.62 which results in a better optical performance than any optical component made out of this material. With these characteristics F2HT is the material of choice for components used in high power laser applications where excellent optical beam performance is required. If you have questions, please contact us at info.optics@schott.com.



Spica Technologies Inc.

LASER DAMAGE THRESHOLD SPECIFICATION SHEET AND CERTIFICATE OF COMPLIANCE

DATE: September 30, 2009

CUSTOMER: Schott North America, Inc.

ADDRESS: 400 York Avenue
Duryea, PA 18642

P.O. NUMBER: 4501054517

PART NUMBER: F2HT

ATTN: Dr. Steffen Reichel

RUN NUMBER: n/a

TEST TYPE: Laser Damage Threshold

QUANTITY: 1

TEST LOG NUMBER: 20570

SUBSTRATE MATERIAL: F2HT

SAMPLE SIZE: 1" Nominal

TEST PREP: Methanol drag

COATING TYPE: n/a

INCIDENCE ANGLE: 0°

TEST WAVELENGTH: 1064 nm

PRF: CW

POLARIZATION: Random

TEST BEAM PROFILE: TEM_{00}

PULSEWIDTH (FWHM): n/a

AXIAL MODES: Multiple

SPOT DIAMETER ($1/e^2$): 9.5 µm

NUMBER OF SITES: 50

TEST METHOD: Least Fluence Failure

SHOT/SITE: 200

DAMAGE DEFINITION: Plasma, increased He-Ne scatter. Visible damage as observed with 100x Nomarski brightfield microscope.

COMMENTS: Laser damage threshold measured as > 40 MW/cm^2, peak irradiance. Part irradiated at > 40 MW/cm^2 with no damage in 10 sites. See data on page 2. Sample exceeds laser power threshold.
NOTE: 3 spare samples were subsequently tested at maximum power, no damage observed.

Spica Technologies certifies that this sample lot has been exposed to the conditions described above. All test and calibration data are maintained on file. All instrument calibration is traceable to NIST.

Test conducted by _____ Date _____

Certificate of compliance and laser damage threshold

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SCHOTT offers solarization stabilized glasses for Concentrator Photovoltaic

Concentrator photovoltaic (CPV) needs glass that withstands high concentrated sun light without solarization (reduction in transmission)

SCHOTT Advanced Optics develops optical glasses stabilized against solarization. Solarization causes a reduction in transmission that occurs by strong UV light illumination. This effect is very strong in plastic, but at high intensities of illumination glass also has the same effect. In CPV sun light is focused and collected (e.g. 500 x) and therefore glass and glass components need to be stabilized against solarization to guarantee high transmission. SCHOTT now offers components for secondary optics for CPV made out of such materials thereby contributing to strengthening alternative energy.

Special component from SCHOTT for CPV applications

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SCHOTT to support new features of Compact Digital Still Cameras (CDSC)

CANON and NIKON are 2 major players and dominate approximately 90% of the worldwide Digital Single Lens Reflections Cameras (DSLR) market by splitting the share in half. It is said that DSLR will reach 10 million sets or more in 2009. SCHOTT has been contributing to this development through delivering Lenses and Penta Prisms into this technology.

In the past, while DSLR was gaining in importance, Compact Digital Still Cameras (CDSC) were the actual driver. It is said that the total number of sets worldwide has achieved about 132 million in 2008, but the annual increase ratio has been stagnating in recent years.

Not only have the total sets been stagnating, but also (a) the competition of pixel-size, and (b) the miniaturization seems to be ending. Cell phones equipped with a "camera" have been achieving 5 million pixels or more these days, making the CDSC market more difficult to grow.

Thus the CDSC market is facing the challenge to regain in importance and market share. New outstanding features such as projectors within cameras, 3D images or an integrated High Vision Camcorder could be the answer. SCHOTT, today supplying Lenses for CDSCs, is constantly working on the extension of its glass portfolio and is confident that new developed glass types will support the designer's work to realize these new features and successfully launch new CDSCs to the market.

If you are thinking about a new optical feature, our experienced application team is specifically trained to find the right solution for your request and our glass developers are open for joint initiatives. Contact us: info.optics@schott.com.

PANASONIC introducing CDSCs with High Vision Camcorder

NIKON introducing CDSCs with projectors

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SCHOTT 125 YEARS

SCHOTT supplies camera objectives used in pool surveillance systems

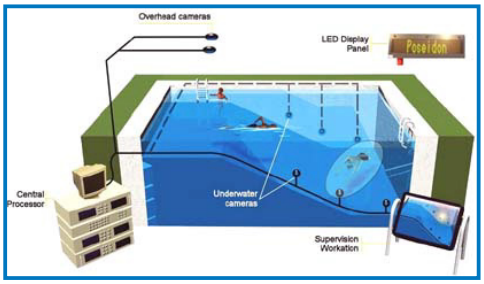
Did you know that 9 people drown daily in the U.S. alone, and in France more than 650 persons each year, 200 of them in swimming pools?

To help prevent drowning accidents, authorities have recommended pool surveillance systems, both for public and private swimming pools.

POSEIDON is a surveillance system offered by MG International, a Marseilles-based company (France), that recognizes texture, volume and movement within a pool. An advanced camera network surveying the pool together with a specialized software system analyzes trajectories of swimmers in real-time and alerts lifeguards within seconds to the exact location of a potential accident.

The special objective of the applied CCD camera is fitted with special filters active in the visible range and IR wavelengths. Coupled with polarizing filters distortion caused by the reflection of the water is filtered out and objects remaining immobile for a defined length of time can be identified.

SCHOTT supplies the complete camera objective system comprising of specific color filters assembled together with polarizing filters. Thus SCHOTT contributes to an improved safety in the water and supports the prevention of drowning accidents.



Setup of the surveillance system in pools

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Magic Moments in Astronomy

Glasses from SCHOTT enrich a fascinating exhibition at the Gasometer Oberhausen, Germany

The "largest moon on earth" which is 25 meters in diameter, is an impressive model of the international space station ISS complete with genuine moon dust. With exhibits like these, the exhibition entitled "Out of this World – Wonders of the Solar System" turns the cosmos into a truly sensual experience. The Gasometer Oberhausen and the German Aerospace Center (DLR) have now prolonged this interesting exhibition that commemorates the international year of astronomy until the end of 2010.

SCHOTT is also represented with a mirror substrate made of ZERODUR® glass-ceramic and round blanks made of optical glass. These products usually cannot be seen in the final application since they are installed inside large telescopes. Hexagonal ZERODUR® mirror elements can be assembled to so-called mirror substrates with diameters up to 40 meters which can be found in today's and tomorrow's large telescopes. To date, five of the world's six large segmented telescopes use ZERODUR® glass-ceramic in this way. The lenses which are also being exhibited, are made of optical glass with high homogeneity and can be found in cameras and spectrographs that are used further downstream from the telescope.

Picture of the ZERODUR® exhibit in the Gasometer Oberhausen
Picture by Gasometer/Oberhausen/Machoczek

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A cooperation to push boundaries of optics

Leica Microsystems manufactures super resolution microscopes - SCHOTT supplies high-end glasses for them

While electron or scanning tunneling microscopes are capable of sufficiently magnifying extremely small objects, such as proteins, they cannot be used to observe living or intact organic material. According to the Abbe's "Law of Diffraction", focused light is unable to resolve details much smaller than 200 nanometers.

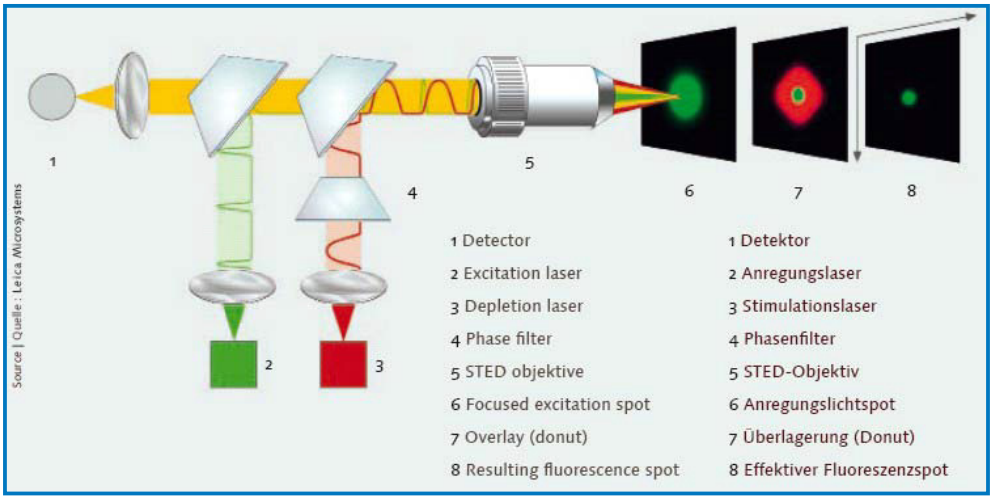
This law was bypassed when the German scientist Prof. Stefan Hell invented the award-winning 4Pi and STED technologies that Leica Microsystems then developed to market maturity. Fluorescence microscopy can now achieve optical resolutions of up to ten nanometers (see info box) and even the transmission of signals in nerve cells can be observed.

SCHOTT is one of the enablers of this technology. The lens system used in the unique STED microscope contains four different glasses from SCHOTT which offer excellent transmission in the main spectral regions, particularly the UV range, as well as extremely low autofluorescence, which results in very reliable measurement findings.

The partnership between SCHOTT and Leica Microsystems extends well beyond a typical supplier relationship. "We cooperate in a number of specialized fields and focus our activities on meeting the needs of customers, pursuing further technological developments and achieving the highest quality," explains Peter Kruell, Sales Director Europe at SCHOTT Advanced Optics and Dr. Claus Gunkel, head of the Leica Optic Center. The "small round-tables on glass" held on a regular basis where experts discuss solutions for meeting product demands and how to design the respective glass portfolio are one example.

SCHOTT and Leica are two partners with the same understanding of quality. SCHOTT is proud to contribute to an outstanding solution such as the STED technology and is confident to be part of similar future achievements with its partners.

STED microscopy (Stimulated Emission Depletion): a focused laser beam excites dye molecules contained in a test sample which then emits light. The afterglow improves the resolution. A second laser beam hits the sample directly after it has been excited by the first, allowing the excited dye molecules to come to rest once again before the fluorescent light is emitted. The second beam is placed around the first one in a ring shape to ensure that only a few molecules glow in the center of the laser spot.



STED technology

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SCHOTT - a significant contributor to the achievement of the Lawrence D. Eicher Award

The technical committee TC 172 of the international standardization organization, ISO, has received the Lawrence D. Eicher Award for outstanding achievements in standardization in the field of optics.

This award also honored SCHOTT for its standardization work of more than 15 years within the field of ISO TC 172 and the significant contributions of several employees representing departments such as R&D, analytical chemistry, specifications, test methods, glass development and more.

International standards have continuously gained in importance and more countries are getting engaged in optical systems, elements and raw materials standardization. The US recently adopted the ISO 10110 series on the specification of optical components and Japan submits an increasing number of proposals for new standards on optical materials.

SCHOTT plays an active role in the definition of relevant standards and has made major contributions to the new standard ISO 12123 specifying optical raw glass to be published early next year. The workgroup TC 172 will use its upcoming meeting to discuss achievements and future steps in optics standardization and also to celebrate the received Lawrence D. Eicher Award.

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SCHOTT supports IONS conference

In 2006, several European Student Chapters of the Optical Society of America decided to collaborate on their research and outreach activities. Getting to know other young scientists on a professional and personal level, discussing science, visiting international research centers, and expanding their personal horizon visiting other countries were the main ideas driving this international effort. As a result, IONS, the International OSA Network of Students, now have conferences in North America, Europe, Asia and Australia.

SCHOTT supports these kind of initiatives and sponsored an event for the students and exhibited at the recent IONS conference held in Washington, DC at the University of Maryland in September. This was the first North American IONS meeting, organized for students, by students (grad student members of OSA or SPIE student chapters at the University of Maryland, William and Mary, UMBC, Cornell, Penn State, University of Connecticut and the University of Delaware and more), also underlining SCHOTT's interest to push entrepreneurship and to teach future opticians self responsibility from the first minute.

Matt Roth, Sales Manager for the Business Unit Advanced Materials, representing SCHOTT at the conference and the booth

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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..

SEMICON Japan, December 3 - 5, 2009, Tokyo - Booth 7A-213

SPIE's Bios, January 23 - 24, 2010, San Francisco, CA - Booth 8406

SPIE Photonics West, January 26 - 28, 2010, San Francisco, CA - Booth 1701

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