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**TECHNICAL INFORMATION & PRODUCT NEWS**



**VOICE OF THE CUSTOMER & INDUSTRY TRENDS**



**REGIONAL & CLOSE UP**



# Rods in new measures to simplify your process

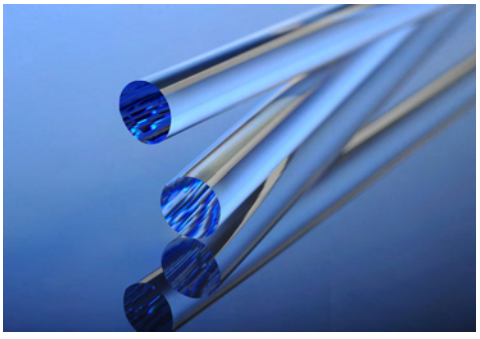
## Rods in new lengths and diameters to revolutionize miniaturization

SCHOTT is aiming to further support the miniaturization and is now able to offer Optical Glass Rods produced with different production technologies in various sizes, shapes and lengths that have not been achieved before.

With a reconditioned process SCHOTT can now supply, on top of the standard supply of matt glass rods, new fire polished rods up to a length of 1000 mm and down to a diameter of less than 1 mm. Due to the new process, large batch sizes can be offered according to customers' needs in regards to diameter, length, surface quality and quantity. With attractive delivery times and flexible production, SCHOTT would be your partner of choice when it comes to further advancing the development of the miniaturization of technical applications. Optical Glass Rods are most likely being used as preforms for the production of small ball lenses or discs for possible applications in mobile phones, digital still cameras or lens caps for the telecommunication market. The recently offered fire polished rods open new opportunities: the fire polished surface may be suitable for selected applications, the new length enables the production of more ball lenses out of one rod and the smaller diameter leads to a reduction of material losses and process cycle time.

Various glass types are suitable for the production of these rods (e.g. P-SK57, P-LASF47, LASF35). Besides the production of standardized round rods, there are initiatives to produce different shapes such as cones, prisms, rectangles and tubes.

If you are interested please contact our sales team and discuss the relevant options!



*Rods of Optical Quality in diameters ranging from 0.1 mm to 12.5 mm and lengths up to 1000 mm.*

# Information about product range of SCHOTT Optical Glasses

## More glass types suitable for precision molding

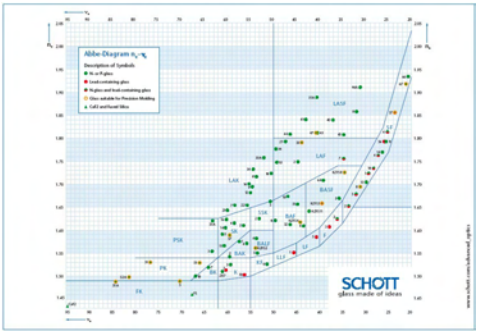
SCHOTT has expanded the availability of optical glasses suitable for the precision mold process. In addition to the already established P- and N-glasses, the following glass types have been successfully tested for the precision mold process: N-KZFS2, N-KZFS4, N-KZFS5, N-KZFS8, N-LAF33, N-LASF46B and SF57.

SCHOTT has also further improved the N-LASF46A. The new variety N-LASF46B (nd= 1.90366; νd = 31.32) possesses a significantly improved transmittance in the blue area $\tau_i$ (at 400 nm, 10 mm) = 85% and is also well suitable for the precision mold process.

In addition, as of the 1st of January 2009, the following glasses have been selected to turn into inquiry glasses: N-LAF36, KZFS12 and P-PK53.

KZFS12 will be available for another 3 years, N-LAF36 and P-PK53 for another 5 years before turning into inquiry glasses.

SCHOTT recommends to generally use only preferred glasses for new optical designs.




*The updated Abbe Diagram shows the positioning of all available glass types*

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# Radiation resistant glass types

## SCHOTT offers solution for applications facing strong radiation

Recently there is renewed interest in nuclear power as an alternative proposal of draining fossil fuel and energy resources. This new hype is called "the Nuclear Power Renaissance". In order to use nuclear energy safely, it is important to monitor and control all the processes in a nuclear power plant properly. Optical systems for CMOS cameras (CMOS stands for Complementary Metal Oxide Semiconductor), that are used in the surveillance systems of high radiation regions, are facing a special problem:

Wherever the standard optical glass is exposed to high energy radiation like gamma-, electron-, proton- and neutron-radiation, e.g. in nuclear power plants, space and other scientific applications, the higher doses of this radiation reduces the transmittance of the glass over time. SCHOTT offers a variety of radiation resistant glasses, covering main parts of the Abbe diagram that are stabilized against such an effect and thus could be the solution. These glasses, which are suitable for the use in nuclear power plants and earth orbit based applications, can be supplied either as pressed or cut lens preforms or as polished and coated loose optics, according to customers specification.

For further interest please contact your local sales office and for more technical information please refer to the technical information TIE-42 on our homepage:

http://www.schott.com/advanced_optics/english/download/tie-42_radiation_resistant_glasses.pdf

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# Synergies and strengths of the SCHOTT group enable realization of EADS project

The Maritime Transport Aircraft C295 VIMAR integrates surveillance radar with automatic tracking and imaging systems with high resolution LEICA RC30 camera. Therefore, EADS-CASA Spain was looking for a supplier able to provide 579 x 551 x 22 mm windows with long range anti reflection coating 400 to 900 nm. The wave front error on 90% of the window surface should be less than 1 lambda and the two sides parallelism should be less than 10 microns.

Within SCHOTT there was no single unit or facility who could offer a solution to EADS, but SCHOTT as a whole unit was the perfect partner. In order to match EADS-CASA requirements, SCHOTT has combined the strengths of various internal facilities and established the following collaboration chain:

- SCHOTT AG, Jena provides five large raw blanks of LITHOSIL® fused silica Q1 (H2 quality).
- SCHOTT Suisse SA, Yverdon cuts and polishes the fused silica material to the final optical windows.
- SCHOTT Advanced Optics in Mainz and SCHOTT R&D in Marienborn develop and apply the coating on the windows.

SCHOTT France, Clichy being responsible for the AOO Spanish market, offered the solution to the customer and will follow the project until the delivery of the last porthole.

Thanks to the complementarities of its factories, SCHOTT Advanced Optics has become the partner of choice and will supply 5 fused silica portholes that will be integrated on the C295 VIMAR PG03 version pressurised aircrafts.

*A Maritime Transport Aircraft C295 VIMAR*

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# SCHOTT scans your fingerprints

## Prisms from SCHOTT as important optical part for Live Scanners

Biometric identification is becoming a more important topic in our lives. The Automated Fingerprint Identification System [(AFIS)/ Live-Scan] is the most common application in the biometric market. In one possible set-up, one important optical part that determines the quality of such a live scanner is the optical glass prism. Typically N-BK7 is used as the material of choice. However, applications that require a better resolution, a higher refractive index material like the N-SF11 glass is beneficial. SCHOTT is able to offer the classical glass types (SF11) for customers looking for high refractive index and larger dimensions, as well as the lighter, more chemical resistant eco version (N-SF11) according to customers' requirements. Due to an advanced technology, SCHOTT is able to offer most materials as economical pressed parts, some even in large dimensions (max. 6 kg). Grinding and polishing can also be applied.

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# SCHOTT experts chair sessions at Optifab

SCHOTT experts contributed to this year's SPIE Optifab show held in Rochester, NY. "Optifab" is a trade show organized by the committee of SPIE focusing on optical fabrication and takes place every other year on the east coast of the US. Dr. Peter Hartmann, Director Market and Customer Relations, SCHOTT Advanced Optics in Mainz, chaired the Optical Manufacturing session along with giving presentations: "Optical Glass - Status & Perspective" and "Optical Glass program of SCHOTT – News & Outlook" in the Optical Materials Session.

Arnie Bazensky, West Coast Regional Sales Manager, SCHOTT North America Inc. in Duryea, PA, chaired the Metrology & Coatings session. In addition, Ed Hart, Sales Manager responsible for IR material gave a presentation on IR material during one of the commercial sessions chaired by Edmund Optics. Please see below a brief synopsis of each presentation.

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## Optical Glass - Status and Perspective by Dr. Peter Hartmann

Optical technologies have been called enabling technologies. So one may call optical glass an enabling material. Some examples illuminate the key role of the variety of optical glass types providing many different properties and outstanding performance. Tendencies have to be observed to save the full range of glass types for the future. Regulations like the EC-directive RoHS may have the side effect to reduce the glass program by essential glass types causing far reaching consequences in industrial optics, metrology, medicine and life sciences.

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## Optical Glass program of SCHOTT - News & Outlook by Dr. Peter Hartmann

New optical glass types have been developed and their properties have been improved. This presentation gave an overview of the latest developments and a perspective for the future glass program with respect to long term reliability and some present adverse trends like the European RoHS and REACH activities.

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## IR Materials by Ed Hart

SCHOTT has been widely recognized as an innovator and world-class supplier of quality materials for the UV to Visible spectral range. Now SCHOTT has expanded its material portfolio to span from the UV into IR. The addition of these materials to SCHOTT's product offering enables customers to have a source capable of addressing their optical and infrared material requirements. The current product offerings include a family of chalcogenide glasses and both grades of Zinc Sulfide – FLIR and CLEAR grades. These new IR products will take advantage of SCHOTT's existing optical processing capabilities and vast experience and address customers mainly in the field of Security and Safety.

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## Advanced Technologies by Arnie Bazensky

The session on "Advanced Technologies" had topics ranging from MTF testing advances to reactive-pulse magnetron sputtered coatings, and included polymer solution coatings, MEMS based piezoelectric energy harvesters, and Ion Beam Figuring for surface corrections of high performance optics up to 700 mm diameter.


*The SCHOTT booth at this year's Optifab*

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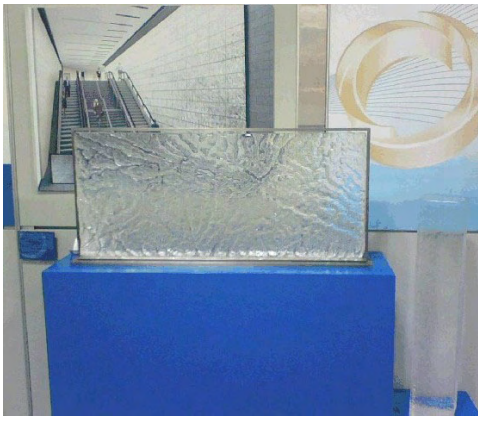
# Glass from Advanced Optics also for Art, Architecture & Design

## SCHOTT Advanced Optics impressively presented its capabilities for Glass in Art & Architecture

SCHOTT exhibited at American Institute of Architects & National Convention Design Exposition in San Francisco, CA. (April 30th-May 2nd) and presented together with the artist, Chris Cosma, a large customized piece of molded glass which will be assembled in a big project in New York. SCHOTT material is well known for applications in optics, lithography, astronomy and science. But glass from Advanced Optics is not only found in industrial, security or medical industries, SCHOTT material is also well suited for applications and projects in Art, Architecture and Design and a significant number of artists use it for either artistic or architectural projects.

If you are an artist and are looking for the perfect material for your project, please contact your local sales person or send an email to: frank.kost@us.schott.com



*A piece of custom melted glass molded in cooperation with an artist for a big architectural project in New York*

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# SPIE Optics & Photonics Show in San Diego, CA

This year's SPIE Optics & Photonics will take place on August 2 – 6 in San Diego, CA.. SCHOTT will be present as an exhibitor and also contribute presentations within the section "Optical Engineering & Applications" at the session "Optical Materials and Structure Technologies IV." Here you will find an abstract of each speech and the respective time information:

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## CTE characterisation of ZERODUR® for the ELT century

This review paper summarizes the extensive investigations that have been done to get a deeper understanding of the CTE homogeneity (**C**oefficient of **T**hermal **E**xpansion) of ZERODUR® within a single blank and the production formats. Statistics of CTE homogeneity measurements on a raw ZERODUR® format suitable for an economic production of ELT mirror blanks using the improved dilatometer, a device to measure the length changes with extreme precision, will be presented. It will be shown that it is possible to achieve tight CTE specifications by utilisation of processes existing at SCHOTT, while at the same time guaranteeing a long-term reproducibility. The CTE measurement is optimized for a temperature interval from 0°C to 50°C. SCHOTT developed a model to extrapolate the CTE behaviour to specific temperature conditions at the site of the telescope.

Presentation No. 7425-3 on August 2nd

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## ZERODUR® glass ceramic for high stress applications

Recent investigations have shown the suitability of the zero expansion glass ceramic material ZERODUR® for applications like mirrors and support structures used with high mechanical loads, e.g. rocket launches, bonded support elements or controlled deformations for optical image correction.

Additional measurements have been conducted on the behavior of ZERODUR® with respect to the etching process that is capable of increasing strength significantly. New data for the strength of the material variant ZERODUR® K20 is available as well as data for the stress corrosion coefficient of ZERODUR® re-measured with the double cleavage drilled compression DCDC method, allowing the measurement of crack length growth in comparatively short time.

Presentation No. 7425-22 on August 3rd

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## History of ZERODUR® glass ceramic for space applications

The zero-expansion glass ceramic ZERODUR® from SCHOTT is widely used for ground-based astronomical mirrors and in industrial applications. This paper points out its great suitability for satellite applications, especially with respect to the space radiation environment. Recent developments show that highly lightweighted components can be manufactured and that such structures are strong enough to survive launch vibrations. A series of reference applications, where ZERODUR® has been or is currently being used (METEOSAT, ROSAT, CHANDRA), demonstrate the high and long lasting performance of ZERODUR® components. These great satellite missions continue to enlarge the successful use of this unique material in space.

Presentation No. 7425-21 on August 3rd

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# Magic Moments in the Himalayas

## SCHOTT supplies ZERODUR® mirror substrate for India's largest astronomical telescope

The emerging nation India is building Asia's largest imaging telescope at the foot of the Himalaya Mountains, northeast of New Delhi. The telescope is optimized for the spectroscopic exploration of the Milky Way. By observing the color spectrum of the light sources, one can determine physicochemical processes, as well as the internal structure or the temperature of the celestial bodies. The telescope should be ready for use and set its focus on the universe over the northern hemisphere by 2012.

With a 3.7 meter mirror made of the glass ceramic ZERODUR® from SCHOTT, the telescope developed by the Belgian company AMOS will rank among the world's top 30. The usage of ZERODUR® as the glass ceramic that is particularly known for its coefficient of thermal expansion that is close to zero, prevents deviations from occurring while measuring the sky, as a result of shifts in temperature. Additionally, this material features extremely high homogeneity, chemical stability and excellent long-term stability of the mechanical properties.

"The high quality of the mirror material is of immense importance for a telescope of this size," explains Frédéric Rausin, project manager at AMOS S.A. Advanced Mechanical and Optical Systems in Liège (Belgium). "Besides, the fact that SCHOTT has so many years of experience with major astronomy projects was of great benefit. This made it possible to complete the extensive processing of the mirror substrate for the active optics of the mirror that significantly improves the image sharpness of the telescope in a very short time," he adds.

SCHOTT received the order to provide and process the ZERODUR® substrate from AMOS, the general contractor, in September of 2008. Only a few months later, in March of 2009, the glass ceramic monolith was delivered to the polisher as a heavy load. After polishing, the blank will be sent to Liège (Belgium), where the specialist for opto-mechanical systems AMOS will complete assembly and perform extensive tests. As soon as these have been concluded, the entire system – 13 meters high and around 120 tons in weight – will be dismantled into modules of 15 tons each. Then, they will begin their long voyage to the Himalayas by heavy transport in order to have the first light in 2012.

*Dr. Thomas Westerhoff, Head of the Product Group ZERODUR® in front of the blank with destination Himalaya*

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# Dedication of New Finishing Area in Duryea

**Continuous improvement to speed up deliveries and further strengthen reliability**

SCHOTT's Advanced Optics Duryea, PA. facility will achieve 2 important milestones this year. Our Duryea facility has been providing the optics community with precision optical materials and services for 40 years this June and on June 8th we inaugurated a newly renovated 30,000 square foot finishing facility with upgraded capabilities.

By expanding our finishing facility, we are now able to respond to our customer requests to provide finished and semi-finished products with faster deliveries and high delivery reliability. This new finishing facility is part of our continuous improvement program focused on customer service. It consolidates processing equipment and personnel from 2 locations into one facility, also allowing for a concentration of quality and logistics functions.

The new facility has a wide range of equipment to meet our customers' needs. This includes CNC cutting, 3, 4 and 5 axis CNC milling, single and double sided grinding and polishing, edging, core drilling, centerless grinding plus much more. The Duryea facility can process parts that range in size from several mm to 1.2 meters and has the corresponding metrology capabilities to qualify and certify the products made.


*Ribbon cutting ceremony performed by Dr. Marita Paasch (Vice President Advanced Optics), Jürgen Schneider (Director Global Operations Advanced Optics), Steve Krenitsky (Vice President & Site Manager of SCHOTT Duryea) and their team*

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# Improved refractive measurement capabilities in the CTSC, China

Recently the SCHOTT **C**ustomer **T**echnology **S**ervice **C**entre (CTSC) in Suzhou setup a new prism coupler device, which now enables SCHOTT to measure the refractive index of lenses with diameters down to 1 mm. With this new setup the CTSC is responding to the continuous miniaturization of optical elements and the related customer inquiries for measurement support. Requests such as production process stability measurement for the refractive index in the precision molding process, even for small lenses, can now be fulfilled with a shorter lead time.

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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, June 15-18, 2009, München, Germany,
Hall: B2, Booth: 320

SPIE Optics & Photonics, August 4-6, 2009, San Diego, CA.

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