

No. 006/2019

15. January 2019

Mainz

World's Largest Convex Mirror Substrate Delivered

SCHOTT manufactured an extremely curved secondary mirror substrate made of ZERODUR® glass-ceramic in Mainz, Germany, for the ESO's Extremely Large Telescope

It is only ten centimeters thin – and that with an extreme curvature, a diameter of 4.25 meters and a weight of three tons. The ZERODUR® glass-ceramic mirror substrate manufactured by SCHOTT for the secondary mirror (Mirror 2 = M2) of the Extremely Large Telescope (ELT) of the ESO (European Southern Observatory) is a technological masterpiece. After sixteen months of production time, it is now starting its journey to France from the main plant in Mainz in a huge, extra-wide transport box. It will receive its “final touch” there or, more precisely, its fine polishing at REOSC, a SAFRAN Group company. The actual mirror layer made of silver with a wafer-thin layer of silicon oxide as a protective film will be applied at the coating facility of the Paranal Observatory in Chile before it is mounted in the telescope.

The requirements for the casting of the 4.25 m mirror substrate were extremely high due to very narrow specifications for the glass quality. Last year, a highly convex mirror substrate only ten centimeters thin was ground from the blank weighing more than ten tons on state-of-the-art CNC machines. Dr. Thomas Westerhoff, Head of the Strategic Business Field ZERODUR® at SCHOTT: “It was a great challenge for our melting team and the experts running the CNC machines. A workpiece with this geometry had never been manufactured before: The M2 will be the largest convex mirror ever made.” In the ELT, it will reflect the light from the 39-meter main mirror extremely precisely onto the downstream mirror. After the “First Light,” the commissioning of the ELT in 2025 on the mountain Cerro Armazones in Chile, its outstanding performance will provide the sharpest view into space compared to previous telescopes. The ELT is ideally equipped for the search for Earth 2.0.

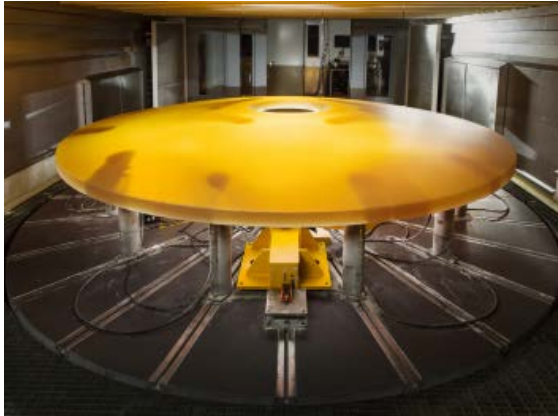
SCHOTT is manufacturing the substrate material for four of the five mirror components of the ELT optics: for the ESO's ELT 39-meter primary mirror with 798 hexagons (plus 131 replacement segments), the 4.25-m secondary mirror that is now being delivered, the 4-m tertiary mirror and the segmented fourth mirror (M4). The ZERODUR® glass-ceramic used has a very low thermal expansion. This predestines it for astronomical applications where

maximum precision is essential. In observing stars, the excellent image quality of the mirrors is always maintained, even when the temperature changes. SCHOTT has been producing this stable material that is resistant to temperature changes and practically doesn't expand for about 50 years. The process know-how has been continuously developed further. Only in this way was it possible for ZERODUR® to become the "standard material" for telescope mirrors on Earth and in space – and for masterpieces such as the extreme M2 for the ELT to succeed.

SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. The company has more than 130 years of outstanding development, materials and technology expertise and offers a broad portfolio of high-quality products and intelligent solutions. SCHOTT is an innovative enabler for many industries, including the home appliance, pharma, electronics, optics, life sciences, automotive and aviation industries. SCHOTT strives to play an important part of everyone's life and is committed to innovation and sustainable success. With more than 15,500 employees at production sites and sales offices in 34 countries, the group has a global presence. In the 2017/2018 fiscal year, SCHOTT generated sales of 2.08 billion euros. The parent company, SCHOTT AG, has its headquarters in Mainz (Germany) and is solely owned by the Carl Zeiss Foundation. As a foundation company, SCHOTT assumes special responsibility for its employees, society and the environment.

Press contact:

Christine Fuhr
Marketing and Communication
SCHOTT AG, Hattenbergstraße 10, 55122 Mainz
Phone: +49 (0)6131/66-4550
e-mail: christine.fuhr@schott.com



The Mirror 2 (M2) for the ELT is the largest convex mirror substrate ever made. Photo: SCHOTT



The secondary mirror support for the ELT is ten centimeters thin - and that with extreme curvature, 4.25 meters in diameter and weighing three tons. Photo: SCHOTT



Group picture with ESO and SCHOTT representatives after the technical acceptance of the M2 mirror substrate. Photo: SCHOTT