PRESS INFORMATION

SCHOTT

In search of dark energy: Observing the expanding universe with SCHOTT specialty glass

Spectrographs in Hobby–Eberly Telescope Dark Energy Experiment composed of BOROFLOAT® glass

Jena (Germany), June 11th, 2015 – **Specialty glass plays a key role in uncovering the far-reaching answers of space. For HEDTEX (Hobby–Eberly Telescope Dark Energy Experiment) at Austin McDonald Observatory (University of Texas at Austin), 156 state-of-the-art spectrographs will serve as the eyes into the universe's distant past to map the three-dimensional positions of one million galaxies. These spectrographs are using optical mirrors based on BOROFLOAT® glass – the floated borosilicate glass made by specialty glass expert SCHOTT. They will capture the full spectrum of light, measure the distances between galaxies at different times in the early universe, and reveal its composition. With those measurements, scientists can deduce the rate of the universe's expansion and further understand the physics of dark energy.**

BOROFLOAT®'s exceptionally high transparency, outstanding visual quality and optical clarity, and its outstanding thermal resistance are the key performance features helping to observe the universe. The very good temperature stability of this glass is crucial to the HETDEX project because the Hobby-Eberly Telescope, the world's third largest optical telescope, located more than 6,600 feet above sea level, experiences seasonal temperature and weather fluctuations throughout the year, including snow in the winter and hot sunshine throughout the summer. Thanks to the extremely low coefficient of thermal expansion, BOROFLOAT® resists the challenging expansion and contraction forces that such change of temperatures would typically cause, ensuring high resolution and consistency in researchers' observation results.

Additionally, SCHOTT's specialty glass boasts high chemical durability and excellent mechanical strength mainly due to the addition of higher amounts of boron oxide in its composition, which strengthens the chemical bonds within the glass network. The added boron oxide gives BOROFLOAT® glass a low light refraction behavior, which together with the material's superior transmission is a key requirement for precise spectrograph measurement results.

Furthermore, light transmission in glasses will be significantly influenced by iron oxide impurity levels. BOROFLOAT® glass is made of pure raw materials, resulting in an extremely low-iron impurity level for float glasses. The sum of it guarantees exceptionally high transmission values. In fact BOROFLOAT® is the industrial glass with the lowest level of iron impurity of all float glass materials in the market.

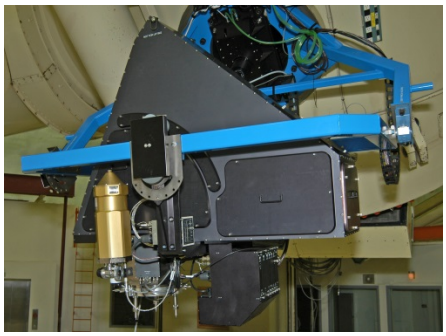
"The HETDEX project holds the key to unlocking the secrets of the cosmos. SCHOTT's glass will serve as a significant material as researchers gaze into the earliest millennia in time to

better understand the forces that continue to shape the universe", said Dan Bukaty Jr., President of Precision Glass and Optics Inc., USA, the company that processes BOROFLOAT® to create the optical mirrors.

For more information visit: https://www.youtube.com/watch?v=BnM-x6-gneg

BOROFLOAT® is a registered trademark of SCHOTT AG.

Photo download link: http://www.schott.com/english/news/press.html?NID=com4711



Prototype of the spectrograph used for HEDTEX: It uses optical mirrors based on BOROFLOAT® glass from SCHOTT. Source: Courtesy of Martin Harris/McDonald.

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Post-processing of SCHOTT's BOROFLOAT® floated borosilicate glass to achieve the smooth surface needed to create optical mirrors. Photo: SCHOTT.

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. SCHOTT is an innovative enabler for many industries, including the home appliance, pharmaceutical, electronics, optics, automotive and aviation industries. SCHOTT strives to play an important part of everyone's life and is committed to innovation and sustainable success. The group maintains a global presence with production sites and sales offices in 35 countries. With its workforce of approximately 15,400 employees, sales of 1.87 billion euros were generated in fiscal year 2013/2014. 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. www.schott.com

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