

SCHOTT
glass made of ideas

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German Glass
Conquers China

BOROFLOAT® – When inspiration meets quality, research achieves milestones

German Glass Conquers China

Swiss company SwissNeutronics supplies a research institute near Hong Kong with important components – made from the special float glass BOROFLOAT® by SCHOTT

Sometimes smooth just isn't smooth enough and when it comes to scientific research on molecular structures of solids, flatness is the key. When it's important to deliver as many neutrons as possible through the guide tubes, ultra-smooth surfaces with a roughness of less than one nanometer are essential. "Not even individual atoms can project on the insides of neutron guides", explains Dr. Christian Schanzer, COO at SwissNeutronics in Klingnau/Switzerland, the leading manufacturer of neutron guides. BOROFLOAT®, the special float glass by SCHOTT, is not only the base for the products as a material – the majority of the company's business is based on the unrivaled quality of BOROFLOAT®. "The outstanding properties of this special float glass provide us with a clear competitive edge", states Dr. Schanzer.

This advantage just paid off again: The Swiss secured access to China's market and they are the supplier of neutron guides for the spallation source at the Institute of High Energy Physics in Dongguan near Hong Kong. The system will have up to 600 meters of guide tubes used in 20 beamlines. "The quality and the good price performance ratio of BOROFLOAT® allowed us to submit a quotation which was better than all others", the COO at SwissNeutronics states. The system is planned to be put into service this year and be one of the biggest of its kind. This deal was an important milestone in the company's history, a leader in the neutron guide market attaining a 60 percent market share. An significant advantage, as only approximately 20 research institutes in the world can even be considered as customers.

Building neutron guides requires extreme precision. After all, the BOROFLOAT® supermirror coating only reflects neutrons at very low angles. "If a wall is slanted or not smooth enough, the neutrons will penetrate the material, which must be avoided", Dr. Schanzer states. SwissNeutronics coats the glass with up to 10,000 nano-thin layers. This is where BOROFLOAT® provides the best extremely flat surface. Schanzer: "We're practically at the physical limits: it can't be topped." The Swiss company's inclination to perfection is not an end unto itself but there's a simple reason: The better the quality of the neutron guides, the greater the neutron yield for scientific experiments. "Last year we replaced a guide section at the Joint Institute for Nuclear Research in Dubna, Russia", Dr. Schanzer reports. "The researcher can now use six times as many neutrons in his experiment than before. In other words: What previously took a day can now be done in four hours."

In addition to the extremely low roughness, the even thickness and high homogeneity are properties that predestine BOROFLOAT® for high-tech applications. Add to this the high chemical and thermal resistance and high mechanical strength: even abrupt temperature fluctuations do not affect the glass, it stays true to size even after many work steps. The high boron ratio, that has a shielding effect, is also extremely important, especially for building neutron guides; it practically 'catches' neutrons. The low net weight makes BOROFLOAT® excellent to use.

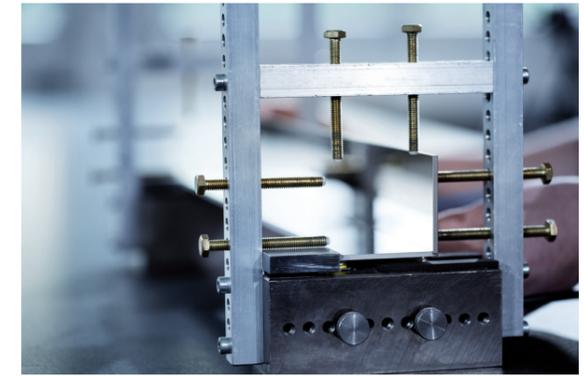
The microfloat process, a special manufacturing method, is key for the unique properties of BOROFLOAT®. The glass ribbon floats on top of a bath of molten tin to then cool down. This patented process guarantees the perfect homogeneity, the extreme flatness and the mirror-like surface of the special float glass by SCHOTT. The high optical quality of BOROFLOAT® comes from a special, 'secret recipe' and is still unrivaled in the field of flat glass.

SwissNeutronics has been working with SCHOTT since 1999. At the time the company was formed as a spin-off of the Paul Scherrer Institute in Villigen, Switzerland, to meet the growing demand for neutron guides in research. Float glass was the material of choice from the beginning, but it wasn't until BOROFLOAT® was utilised that the high standards of research were truly met. The special float glass by SCHOTT now serves as a reference substrate for quality assurance at SwissNeutronics. Dr. Schanzer: "No other material has this high and consistent quality spanning decades. It therefore provides ideal requirements for improving our coatings. BOROFLOAT® is our opportunity to improve the quality considerably in this respect."

Current imagery (© 2018)
(Additional imagery available on demand)



pic_01: Coated BOROFLOAT® special float glass is installed in a high precision neutron guide



pic_02: Adjusting the reflecting surfaces



pic_03: Measurement in the micrometer range



pic_04: Final inspection of the finished neutron guide



pic_05: Even today precision still requires good manual labor



pic_06: Nano-thin reflecting surface during final visual inspection

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