Optical glass premiered by SCHOTT is 100 percent hydrogen-produced

In a titanic leap towards climate-friendly specialty glass production, SCHOTT recently made glass exclusively from a hydrogen-heated furnace, even though a lack of green hydrogen infrastructure would currently delay its use at industrial scale.

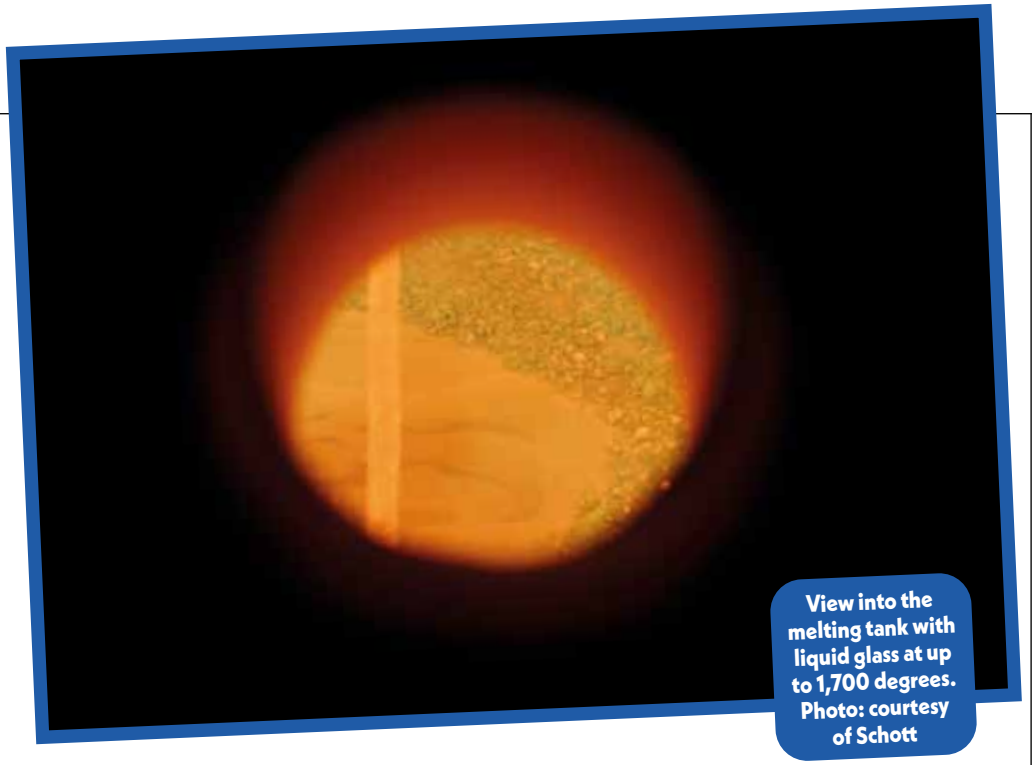
Successful testing on a large industrial scale: Schott has produced an optical glass with 100 percent hydrogen for the first time. Photo: courtesy of Schott

After successful lab testing of glass production with 100 percent hydrogen last spring, Schott has now completed a much-anticipated, industrial-scale application - signalling yet another milestone by the technology group as it continues to forge ahead towards climate-neutral production.

INDUSTRY DÉBUT

For three days, the Mainz-based specialty glass expert melted optical glass in a furnace using the new technology for the first time - exclusively heated by hydrogen, completely free of natural gas. So far, Schott has been conducting its tests with grey hydrogen given that green hydrogen,

produced from renewable energies, remains unavailable still in sufficient quantities. The large-scale test got top marks and the quality of the glass is now being analysed. Said Schott project manager Dr Lenka Deneke: “The test with 100 percent hydrogen is pioneering work for the specialty glass industry. If it further shows that the glass quality is right and its properties remain unchanged then hydrogen would indeed be a suit-



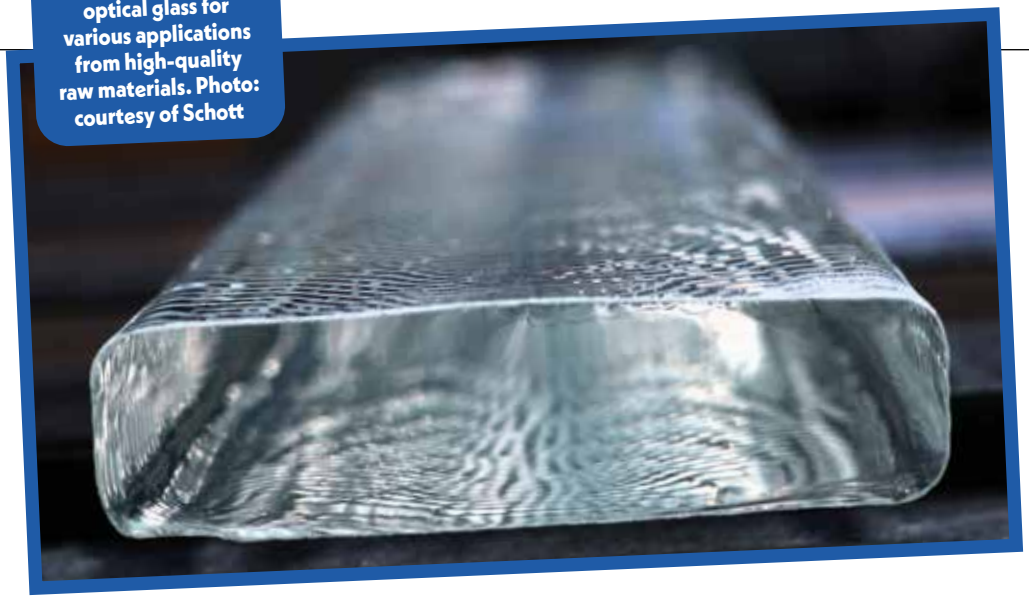
View into the melting tank with liquid glass at up to 1,700 degrees. Photo: courtesy of Schott

Inspection of a glass bar: The large-scale test received excellent marks, and the quality of the glass is now being analysed. Photo: courtesy of Schott

able technology option." The test manager emphasised that the experience gained from last year's tank tests with an initial 35 percent hydrogen-by-volume helped tremendously with this success - also asserting that there remain many unanswered questions that require further research. These would include questions like: 'How does hydrogen use impact the complex melting processes and the quality of different products therein? What long-term effects does heating with hydrogen have on the plant itself? What infrastructure would need to be adapted for hydrogen to be optimally used as a substitute for natural gas in operations? To answer these questions, Schott chose an optical glass for its first test product. To offer some background, the technology group manufactures over 100 optical glass types from high-quality raw materials for various applications. These include consumer goods and measurement technology as well as optical systems in research and development. The challenge here is that the glass must have the highest homogeneity and transmission properties. This also applies to the molten glass, which undergoes strict quality testing.

CONQUESTS STEP-BY-STEP

If the glass meets the high product requirements it gets sent to the customer. "We would then have confirmation that the use of 100 percent hydrogen instead of fossil fuels delivers the same quality under industrial conditions," says Deneke. A permanent changeover would thereafter require further long-term tests and continuous supply via a hydrogen pipeline. Only then would the Group have taken another important step towards its strategic goal of climate-neutral glass production by 2030. In this context, climate-neutral means no Scope 1 or 2 emissions according to the



Schott manufactures over 100 types of optical glass for various applications from high-quality raw materials. Photo: courtesy of Schott

Greenhouse Gas Protocol. Schott is currently pursuing this goal with activities in four fields of action: Technology change (such as the switch to green hydrogen), expansion of energy efficiency, conversion to 100 percent green electricity and, as a final step, the compensation of remaining emissions through involvement in climate protection projects. The company has already achieved the switch to 100 percent green electricity, with energy efficiency being continuously and systematically increased. This technology shift is primarily about replacing natural gas for operation of the furnaces. Either through electrification with green electricity or in future through the use of green hydrogen. To this end, Schott had already carried out the first large-scale tests with local partners towards the end of 2022 with 35 percent hydrogen added to natural gas. Thereafter laboratory tests with 100 percent hydrogen use followed in spring 2023 - paving the way for large-scale industrial use.

Schott receives financial support from various institutions for its development work in the field of hydrogen. Photo: Photo: courtesy of Schott

INFRASTRUCTURE CHALLENGES: GREEN HYDROGEN IN SHORT SUPPLY

For the large-scale tank test with 100 percent hydrogen heating, the hydrogen tank at Schott in Mainz was filled three times - only with grey, not green, climate-neutral hydrogen. This is because hydrogen produced using renewable energies remains in short supply still. "We deliberately decided to use it so we wouldn't lose time testing its technical feasibility. This suffices for our tests, but we urgently need green energy for climate protection," says Dr Frank Heinricht, Chairman of the Board of Management at Schott and person-in-charge of the Group's sustainability strategy. The current appeal to politicians runs: "Companies from energy-intensive industries need to set the course for the fastest possible development of a functioning infrastructure for green electricity and green hydrogen in Germany. Then our commitment will pay off - both for the climate and for industry competitiveness."

EU AND FEDERAL FUNDING

In addition to its own investments, Schott receives financial support from various institutions for its developmental work in the field of hydrogen. The tests were supported by the Federal Ministry of Education and Research BMBF and the DLR project management organisation in the MiGWa project as well as 'Financed by the European Union-NextGenerationEU'. Together with the Rhineland-Palatinate Ministry for Climate Protection, Environment, Energy and Mobility, the project 'H2 Industry - Use of Hydrogen in Industrial Combustion Processes' was funded by the European Union from the European Regional Development Fund. Finally, the Kopernikus project 'Power-to-X' was funded by the Federal Ministry of Education and Research BMBF.

SCHOTT
glass made of ideas

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