

Press release

July 21, 2026

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Launch of GRID_FUSE research project

Sensors for online monitoring of hydrogen purity

Green hydrogen is naturally pure. However, impurities can arise during its journey from production to consumption, which can damage infrastructure and impair its use in fuel cells. As part of the GRID_FUSE research project, which was launched in June, Fraunhofer IPM is developing sensor technology for the continuous monitoring of hydrogen purity. The goal is to create a cost-effective sensor array that combines multiple measurement methods to detect impurities in the sub-ppm range.

Green hydrogen, produced by electrolysis using renewable energy, is a clean solution for both the climate and the purity of the produced gas. However, green hydrogen can become contaminated during production, transport, or storage. Traces of oxygen and moisture in hydrogen can have serious implications for the efficiency, safety, and service life of hydrogen-carrying systems. Minimal contamination in hydrogen fuel cells and electrolyzers can reduce performance, shorten service life, and increase the risk of explosion. Residual moisture causes pipes and fittings to corrode and metals to become brittle. At ultra-low temperatures, like those found at hydrogen refueling stations, valves can freeze. The purity of hydrogen as a fuel is therefore regulated by an ISO standard and must not exceed 5 parts per million (ppm).

Cost-effective sensor array for comprehensive monitoring

Until now, hydrogen quality has been monitored using gas chromatographs and spectrometers. The latter can detect even very low concentrations of oxygen and residual moisture. But these methods are time-consuming and expensive, and only allow spot checks of purity. A cost-effective sensor array is intended to continuously monitor hydrogen purity at critical points in the infrastructure in real time. The array will focus on detecting contaminants such as water and oxygen. As part of the GRID_FUSE project, researchers at Fraunhofer IPM are combining ultrasonic sensors, thermal conductivity measurement technology, and ultrasonic flowmeters into a single sensor array. AI-based fusion algorithms analyze the fused sensor data to precisely assess the gas's purity level. To characterize the sensors, Fraunhofer IPM is setting up a pressure-tight test rig to detect hydrogen impurities at low flow rates.

Information about the GRID_FUSE project

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GRID_FUSE: A sensor array for the continuous monitoring of impurities in green hydrogen at critical points in the hydrogen network.

The project is funded by the Federal Ministry of Research, Technology and Space.

- Project management agency: ptj
- Project coordination: Fraunhofer IPM
- Project duration: June 1, 2026 to May 31, 2029

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