Fraunhofer
IMWS

FRAUNHOFER INSTITUTE FOR MICROSTRUCTURE OF MATERIALS AND SYSTEMS IMWS


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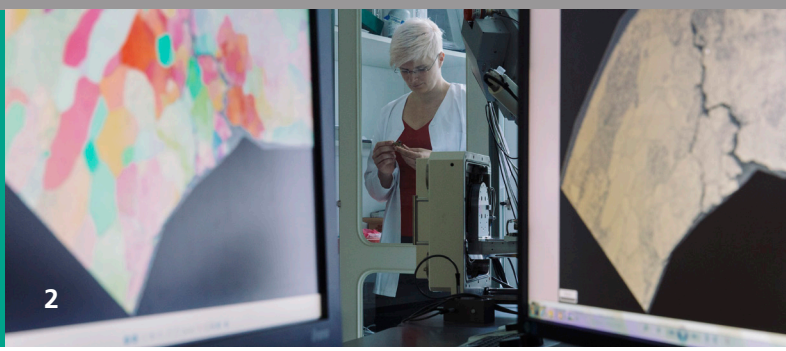
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1 *Main building of Fraunhofer IMWS with technical site and labs in Walter-Huelse-Strasse 1 in Halle (Saale)*

2 *Within the Fraunhofer-Gesellschaft, Fraunhofer IMWS has the most comprehensive range of technical equipment for microstructure diagnostics.*

HEAD OF INSTITUTE WANTED

PROFILE AND MISSION

The Fraunhofer IMWS is a methodologically oriented Fraunhofer institute working in the disciplines of materials science and materials engineering. The Fraunhofer IMWS is a point of contact for industry and public service clients on all questions relating to the microstructure of materials and systems. Its aim is to increase material efficiency and economy and conserve resources. With 260 employees in four branches, the work of the Fraunhofer IMWS is directed at identifying errors and weak spots in materials, components and systems at the micro and nano scale, explaining how they have arisen and providing solutions for clients in its business units microelectronics, photovoltaics, plastics engineering, biomaterials, optical materials and chemical conversion processes based on those findings.

With us, you work to shape the future, for the benefit of society and close to industri-al application.

EXCELLENCE AND NETWORK

Our internationally recognized expertise in the analysis of microstructures is complemented by the microstructure-based design of materials. Per year, we provide the scientific community with about 100 publications on these topics. The institute within the Fraunhofer-Gesellschaft has the most comprehensive range of technical equipment for microstructure diagnostics.

FUTURE TOPICS

The Fraunhofer IMWS wants to set benchmarks for the assessment of complex mate-rials in terms of reliability and properties in operation. Our future topics include the (further) development of microstructure-enlightening methods (e.g. for high-throughput screening), microstructure-based device development, the use of artificial intelligence in materials diagnostics and the digital twin as a data-based representation of a material.

Fraunhofer Institute for Microstructure of Materials and Systems IMWS

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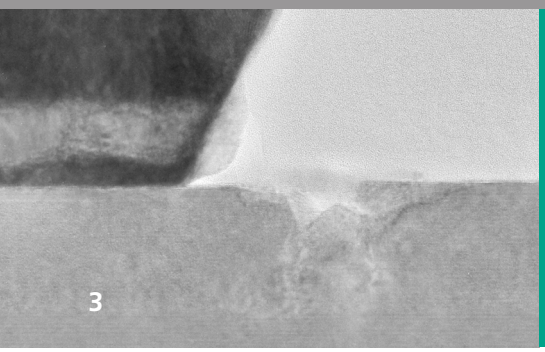
CURRENT HGHLIGHTS



3 *Pitting-Defect on the gate of a high-electron-mobility transistor (HEMT) made of GaN. This pitting arises due to mechanical tensions and electrochemical oxidation.*

4 *Digital solutions for polymer processing are developed in the "digitalTPC" project to-gether with three other Fraunhofer institutes.*

Micostructure analytics: Ultimate GaN

Galliumnitride (GaN) offers enormous potential for power and high-frequency elec-tronics as a new semi-conductor material. Fraunhofer IMWS is working together with 26 European partners in the project „Ultimate GaN" to exploit the global market po-tential of this technology at competitive costs. The institute's activities focus on the structural characte-rization and high-resolution failure analysis of lateral and vertical GaN architectures and contribute to a deeper understanding of the failure modes and degradation mechanisms that occur. This includes the development of specially adapted analysis methods for the localization and physical analysis of defects.

Device engineering: microPREP™

Within its core competence microstructure dia-gnostics, Fraunhofer IMWS is also devel-oping new device technology solutions. Together with 3D-Micromac AG, microPREPTM was launched on the market, which uses state-of-the-art ultra-short pulse laser tech-nology for faster and more flexible sample preparation for microstructural testing. The system is suitable for editing semiconductors, metals, ceramics, glasses and composite materials.

Digitalization: digitalTPC

Together with three other Fraunhofer institutes, Fraunhofer IMWS is developing a digital twin for thermoplastic composites and thus generating further competences in microstructure-based materials design. The project uses the large-scale hybrid injection moulding technology that is currently establi-shing itself on the market. The approach aims at the digital mapping of a complete value chain with regard to material and material changes during production and later in use.

Pilot plants: electrolysis platform

With the electrolysis testing platform at the chemical site in Leuna, Fraunhofer IMWS wants to demonstrate together with partners that green hydrogen can be produced on a large scale as a starting material for basic chemicals and fuels. The focus is on the deve-lopment and upscaling of electrolysis systems, the exploration of new fields of application as well as the diagnosis of material interactions with hydrogen.