microPREP® PRO

NEW VISTAS FOR FAILURE ANALYSIS AND SAMPLE PREPARATION

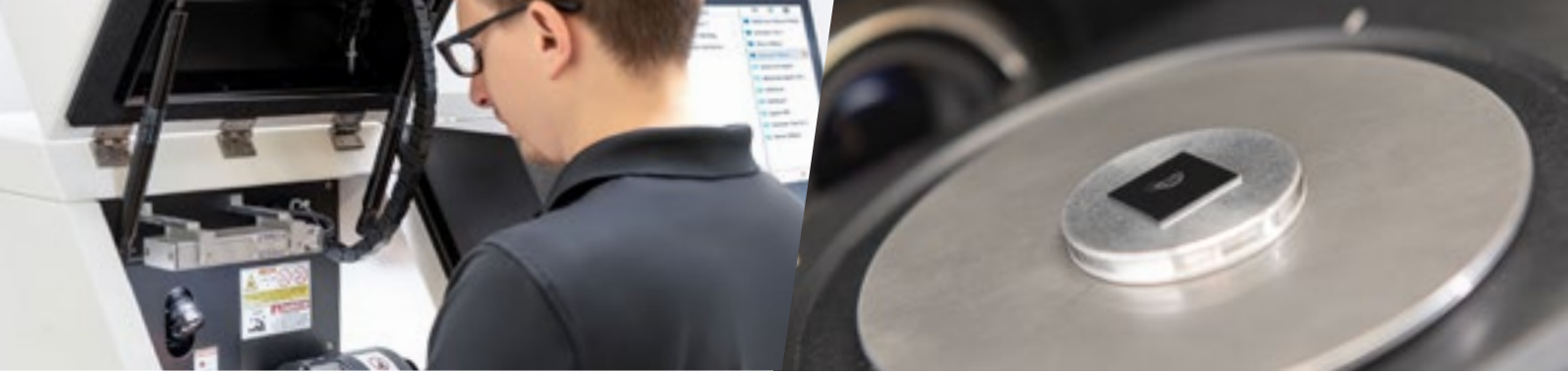
The microPREP PRO enables laser-based sample preparation for a variety of specimen preparation applications. It complements existing approaches to sample preparation such as ion beam processing. A choice of laser sources is available for installation to enhance the individual preparation process.

microPREP PRO is suited to ablate metals, semiconductors, ceramics, polymers, and compound materials. It creates new vistas for material and process development as well as failure analysis.

HIGHLIGHTS

- Free-form sample preparation
- Provides samples with micron-level precision
- Sophisticated workflows for automated tasks
- Reduces time-to-sample significantly
- Lower cost per sample
- Different laser sources available according to individual preparation needs

3D MICROMAC



Unique Workflows

Sophisticated workflows have been developed to meet the specific requirements of cutting-edge analytical techniques, such as TEM, SEM/FIB cross sectional analysis, atom probe as well as X-ray tomography or even micromechanical testing. Numerous patents ensure competitive advantages for users compared to existing approaches in the field of sample preparation.

Laser

At sufficient power, laser radiation is able to ablate all kinds of materials. Lasers can be very precisely positioned on a given workpiece and straightforwardly focused using standard optical elements. By using ultra-short pulse lengths in the pico- or femtosecond range, superficial surface heat influence from ablation is narrowed to depths of a few hundreds of nanometer or less.

Flexibility

The modular software design provides high flexibility for a broad range of microstructure diagnostic techniques. microPREP PRO allows to create complex 3D-shaped samples that enable comprehensive analysis of certain structures based on generic patterns or DXF-files.

Handling

Samples are easy to handle and can be transferred to follow-up processes safely as microPREP PRO works with standard specimen stubs and mounts. The integrated overview and high-resolution process cameras ensure sample preparation with micrometer precision. Advanced features like the motorized stages together with the intuitive software enable users to execute preparation tasks conveniently and in very short time.

Cleaning

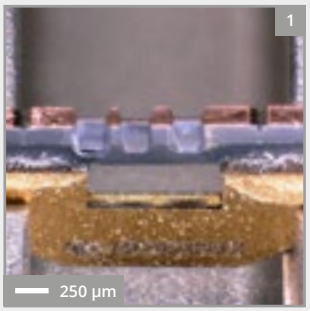
For best results in terms of specimen cleanliness and an optimal start for post-processing steps, microPREP PRO can be fitted with a CO_2 Snow Jet. This contactless nonabrasive cleaning system removes debris broadly within seconds. Cleaning wit the CO_2 Snow Jet means no chemical or crosscontamination for the sample.

Efficiency

microPREP PRO reduces time-to-sample significantly. In addition, microPREP PRO gurantees a higher utilization of other tools within the analysis chain while keeping the costs of ownership low.

In 2024 microPREP PRO FEMTO received the Laser Focus World Innovation Award

FIELDS OF APPLICATION

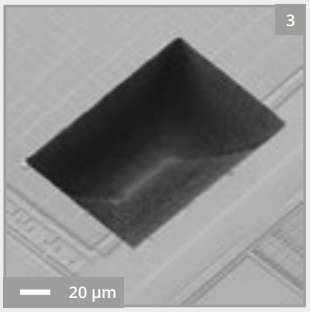


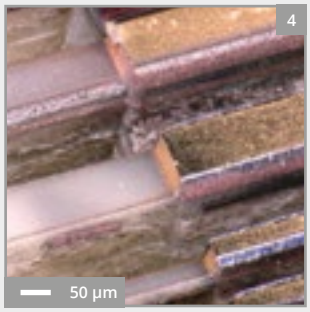
Transmission Electron Microscopy (TEM)

microPREP PRO provides specific sample geometries for in-plane TEM-investigations and H-bars for cross sectional analyses. Just the final polishing is needed.

Fig. 1: Advanced Chunk (total lenght: 3.2 mm) with multiple lamellas from an IC-device (size of lamellas: 150 µm x 50 µm x 10 µm)

Fig. 2: Pre-thinned halfgrid structure of a foil/thin sheet of a material (here: silicon wafer)



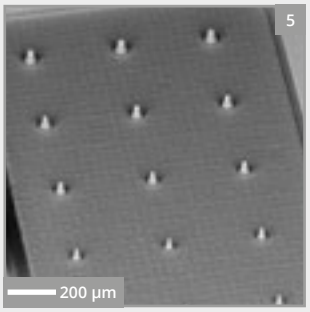


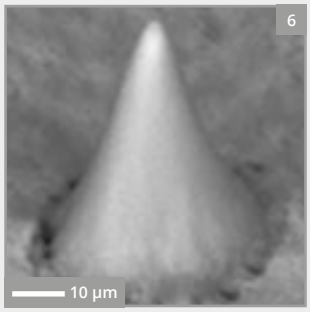
Focused Ion Beam and Scanning Electron Microscopy (FIB/SEM)

The high ablation rate of the laser can be used for time efficient box milling as a starting point for FIB polishing at a target position. Thus, FIB-time can be reduced to a minimum.

Fig. 3: Box milling in preparation for FIB polishing in an IC-structure

Fig. 4: Laser prepared cross-sections in an IC-package



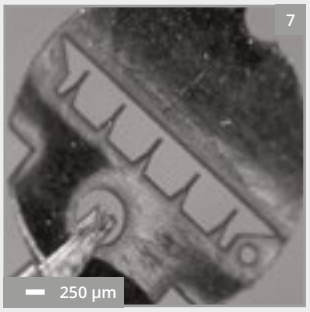


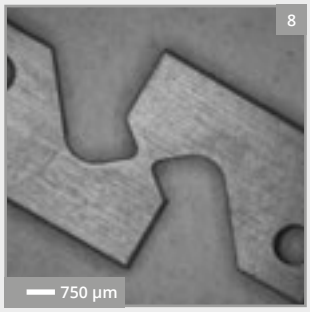
3D-Analysis

microPREP PRO can be operated as a lathe tool to prepare cylindrical samples with micrometer dimensions. In addition, microPREP PRO can prepare a slice and view geometry to start 3D-Analysis within the FIB directly.

Fig. 5: Preparation of probe cards for atom probe analysis with microRPEP™ PRO FEMTO. The size of each pillar can be specified individually.

Fig. 6: View of a single pillar of the probe card prepared by laser ablation. To prepare the final shape a FIB preparation is required.





Cutting

microPREP PRO can be used to generate samples of almost arbitrary shapes exactly after user's specifications. For example pre-defined shapes are available for bending or tensile test specimens.

Fig. 7: Multi-pillar sample design cut out of a steel alloy

Fig. 8: Sample for micromechanical testing cut from Zirconium

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3D-Micromac AG is the industry leader in laser micromachining. We develop processes, machines and turnkey solutions at the highest technical and technological level. Our aim is to provide superb customer satisfaction even for the most complex projects.

3D-Micromac delivers powerful, user-friendly and leading-edge processes with superior production efficiency. These proprietary technology innovations are now readily available on a worldwide scale.

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