

microPREP™ 1.1

High-Throughput Laser Based Microdiagnostics Sample Preparation

3D-Micromac's microPREP™ 1.1 is the first instrument to enable fast, clean, and efficient laser ablation available for the preparation of samples for microstructure diagnostics and failure analysis.

microPREP™ provides key benefits of micromachining using ultrashort pulsed lasers, particularly low structural damage, high power densities and targeted precision on the micron scale. Thus microPREP™ is up for laser cutting and local laser thinning in semiconductors, metals, ceramics, as well as compounds.

microPREP™ 1.1 offers:

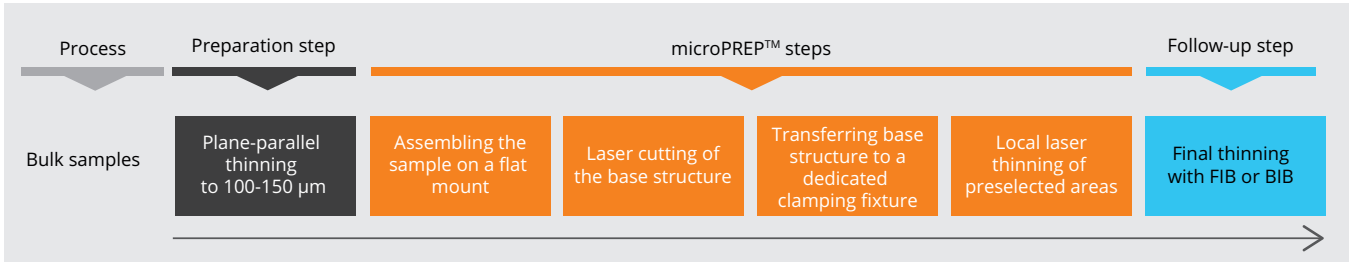
- Shorter time to sample: up to 10,000 times faster than FIB
- Analysis-adopted sample geometry
- Minimized risk of sample loss
- Recipe-driven GUI for sample geometries and materials
- Reduced FIB capacity requirements
- Enhanced efficiency of existing (TEM) analysis tools
- Custom recipes and fixtures on request
- Meets the essential requirements of the SEMI S2/S8



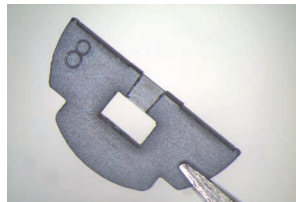
microPREP™ 1.1 - Process Flows

1. In-Plane Geometries and Bulk Samples (Cutting/Thinning)

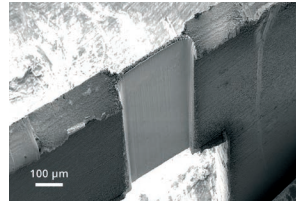
For investigation of bulk-samples by transmission electron microscopy (TEM), microPREP™ offers an unique three-stage approach. This includes laser-cutting of a monolithic basic structure from a feedstock followed by subsequent laser-thinning to a few micron thickness and final thinning to electron transparency using either a broad ion beam (BIB) or a focused ion beam (FIB) while offering up to 10,000 times higher ablation rates and an order of magnitude lower cost of ownership compared to FIB.



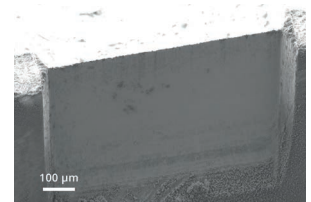
Examples of Application



Basic structure cut and thinned (Photovoltaic Si-Wafer)



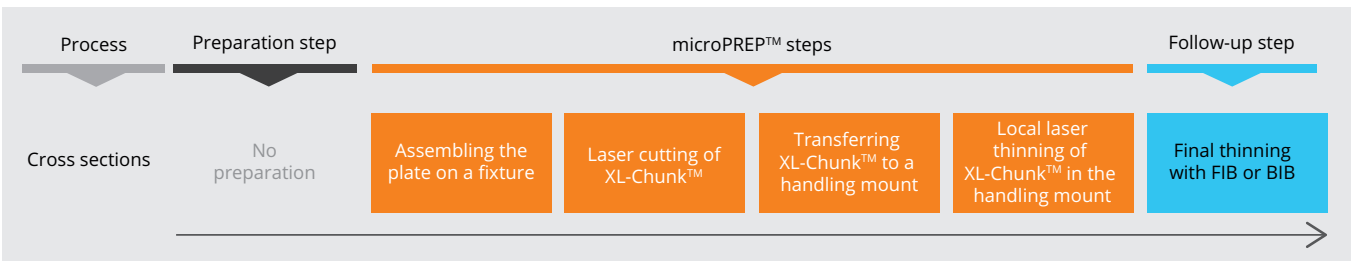
SEM micrograph of a basic structure in copper after local thinning in an open-box manner



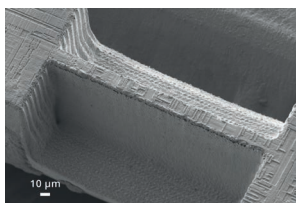
SEM micrograph of a basic structure in a Si-Wafer thinned to < 15 µm thickness (width of 1 mm)

2. Cross Sections (XL-Chunk™)

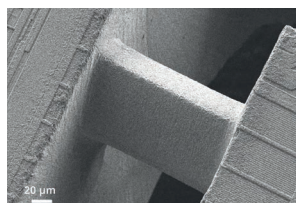
In order to achieve TEM-inspection of cross-sections, microPREP™ enables „push-the-button“-preparation of site-specific XL-Chunks™ by excavating and undercutting a well-defined volume from an arbitrary but flat sample surface. To further reduce FIB-capacity, XL-Chunks™ can be laser-thinned automatically to a few micron thicknesses at a region of interest according to customer’s needs, while providing order of magnitude time and cost savings compared to traditional sample preparation methods.



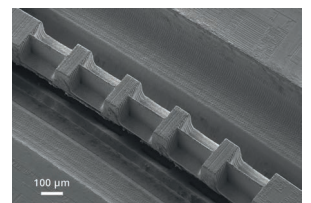
Examples of Application



SEM micrograph of the thinned area of an XL-Chunk™ prepared from an IC-sample



SEM micrograph of the supporting structure of an XL-Chunk™

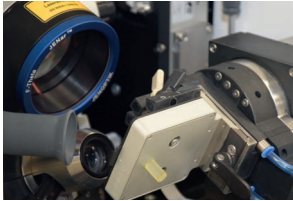


SEM micrograph of an XL-Chunk™ prepared from an IC-sample which has been thinned at multiple positions

System Description

microPREP™ 1.1 is suited for

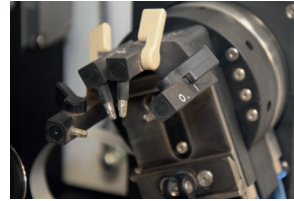
- Fast sample preparation of semiconductors, metals, ceramics, and compounds
- High accuracy target preparation of ± 0.005 mm
- Marking for sample track and trace (DMC, QR code, plain text, etc.)
- Increasing the workflow throughput of FIB and broad ion beam tools
- TEM, X-SEM, and micromechanical testing



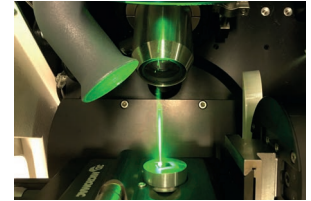
Working setup



Sample fixtures with dovetail guide



Air jet for particle removal while laser machining



In-plane sample preparation

Workpiece size	<ul style="list-style-type: none"> • Contour cutting: $25 \times 25 \times 0.1 - 1 \text{ mm}^3$, volume samples on request • XL-Chunk™: $25 \times 25 \times 10 \text{ mm}^3$
Alignment	<ul style="list-style-type: none"> • Manual work piece alignment with optical measurement system
Positioning	<ul style="list-style-type: none"> • Process accuracy ± 0.005 mm (XY) • Customized motion concept
Sample fixtures	<ul style="list-style-type: none"> • Special fixtures with force setting, optional adjusted for each material and sample thickness • Contour cutting $25 \times 25 \times 0,5 \text{ mm}^3$
Basic processes	<ul style="list-style-type: none"> • In-plane cutting • Laser thinning • XL-Chunk™ cutting
Laser unit	<ul style="list-style-type: none"> • Integrated pulsed DPSS laser source • Galvanometer scanner • Power measurement on sample level
Software	<ul style="list-style-type: none"> • Software guided workflows • Recipe based process control • Intuitive menu guided touch screen operation • Multiple user concept with different user levels • Integrated data and sample management
Safety	<ul style="list-style-type: none"> • Laser class 1 housing with integrated control panel • Integrated exhaust system
Dimensions	<ul style="list-style-type: none"> • Desktop system: $825 \times 760 \times 420 \text{ mm}^3$ (L x W x H), approx. 135 kg
Consumables	<ul style="list-style-type: none"> • Compressed air or inert gases: up to 250 l/min (max. 6 - 10 bar)
Electrical connection	<ul style="list-style-type: none"> • 230 V, 50/60 Hz, 8 A • 110 V, 50/60 Hz, 16 A
Options	<ul style="list-style-type: none"> • Various sample fixtures for different tasks and analysis techniques • XRM-1 workflow (XL-Chunk™ required) • Custom shape import • Stand alone pedestal



3D-Micromac AG

Technologie-Campus 8
D-09126 Chemnitz
Germany

Phone: +49 371 40043 0
Fax: +49 371 40043 40
E-Mail: sales@3d-micromac.com
Web: www.3d-micromac.com



Rev. 2018-3

Changes in accordance to technical progress are reserved.