

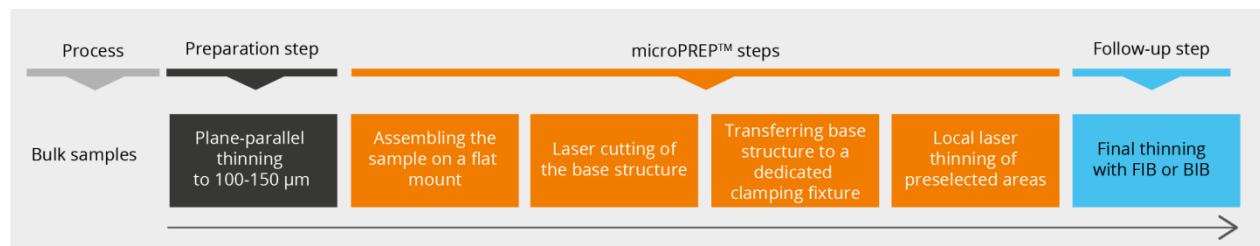
Laser-Based Sample Preparation for Microstructure Diagnostics

Laser micromachining opens up new vistas for targeted and high-throughput methods of microstructure diagnostics

Microstructure diagnostics and failure analyses are pivotal for the ongoing improvement of functional materials and sophisticated components. Although Lasers are well established tools and probes in manifold applications, they got broadly neglected for sample preparation due to apprehensions regarding structural damage. Using ultrashort pulses and optimized processing routes, the latter concerns can be dispelled and laser processing is entering the scene, speeding up processes and opening up access to deeply buried structures and large-area preparation.

Meet Needs

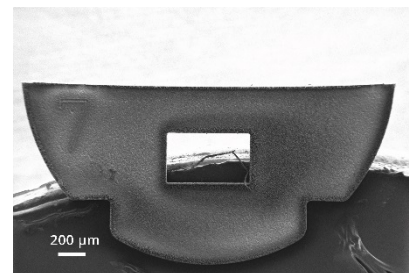
There is an increasing demand for preparation techniques tuned to manifold methods of microstructure diagnostics that need to be fast, reliable, cost effective, artifact-free, and targeted. Besides traditional mechanical preparation, focused-ion-beam micromachining is currently dominating the field. While the former is accompanied by high costs for skilled personnel, the latter is characterized by very high costs of ownership.



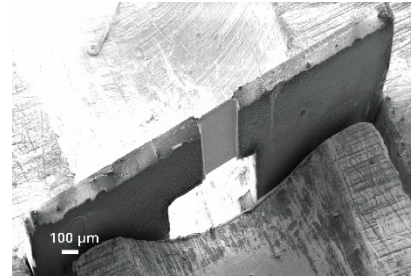
Laser-based preparation represents a very valuable alternative approach as shown below. Based on patented processing, 3D-Micromac's microPREP™ is ready to do the laser cutting of a base structure followed by local laser thinning in an almost entirely automated fashion. Making use of a rugged pulsed laser source, the process is characterized by very low running costs, suitability for semiconductors, metals, ceramics, as well as compounds thereof, and a very high targeted precision on the micron scale.

Unequaled Flexibility Helps Fulfilling Manifold Demands

Using finely focused lasers as a tool for micromachining gives you a wealth of flexibility. It is not just that you can design and cut a supporting structure to exactly fit the needs for successive characterization of the microstructure (like tips, bars, etc.), also the second step of the laser-based preparation (the thinning of the supported structure) offers an unequaled choice of patterns to micromachine.



Making use of this features, allows the operator to exactly tune sample preparation to the requirement of microstructure diagnostics. Lined up with ion-beam thinning, electron transparent sections cannot just made at one position of your choice, but multiple positions, allowing for high-throughput screening of the microstructure. This feature is particularly valuable for gradient materials and if the homogeneity of a given microstructure needs to become evaluated.



Semi-Automated Processing

3D-Micromac's all-new microPREP™ workstation was developed to provide efficient laser micromachining fitted to the needs of microstructure diagnostics and failure diagnostics.



microPREP™ - desktop system

The modular software design of microPREP™ ensures high flexibility for machining of samples for a broad range of microstructure diagnostics techniques.

Besides the provision of recipes and the capability to mark samples for easy tracking, this novel approach features three orders of magnitude higher ablation rates in comparison to purely ion-beam-based processes.

microPREP™ is not just a tools to prepare samples for transmission electron microscopy but will come with options for atom-probe tomography, transmission Kikuchi diffraction, and micromechanical testing. The modular stage and software design will allow to meet the growing requirements of clients and the market.

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