Deutsches Zentrum
DLR für Luft- und Raumfahrt

Handout

Focused Ion Beam / Dual Beam (FIB)

Measured values
- dimension measurement
- volume

Description of facility
The Focused Ion Beam/Dual Beam (FIB/SEM) is a highly versatile tool in the field of materials research. It consist of a fully equipped scanning electron microscope (SEM) incorporating a scanning ion beam column. The latter one allows imaging of the surface of the samples by ion induced secondary electrons as well as by secondary ions. Depending on the selected beam parameters, the focused ion beam is used to remove material from the sample. This, in conjunction with electron beam imaging enables structuring of the samples surface with an accuracy in the range of 10 nm. The gas injection systems (GIS) installed allows electron- or ion-induced local deposition of materials.

Equipment:

- Dual-Beam FIB FEI Helios 600i
- SEM: Field emission cathode, resolution of 0,9 nm at 1 keV acceleration voltage
- FIB: Tomahawk-column (Ga+-source), resolution: 2,5 nm at 30 kV acceleration voltage
- Chamber and in column secondary- und backscatter electron detectors, concentric backscatter electron detectors (CBS), secondary electron and ion detector (ICE)
- Gas injection systems (GIS) for Pt, W and C deposition
- „Easy Lift" in situ micromanipulator
- Electron source for the compensation of sample charging during ion beam use

Application
The combination of ion beam cutting and electron imaging facilitates the highly localized metallographic sectioning of all materials accessible by scanning electron microscopy. Sequential sectioning and imaging is the fundament of the "slice and view" technique delivering three dimensional microstructure information. Furthermore, thin lamellae for TEM investigations can be produced from relevant regions of devices or materials by controlled thinning. Removal is done by means of an integrated micro manipulator.

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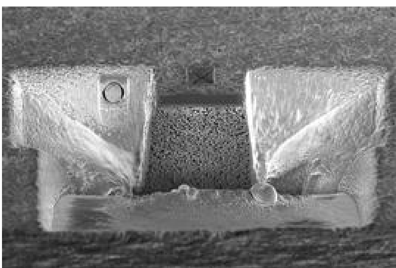
This handout, and cross-references to related measurement techiques and facilities are available at: http://messtec.dlr.de/link-566-en.

WHIPOX© matrix material dissected by FIB ion beam etching, secondary electron SEM image.



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