EBS3

Automated serial sectioning for electron backscattered diffraction analysis

EBS3™ is software that extends the acquisition of 3D electron backscattered diffraction analysis (EBSD) to 3D by fully automating the process of cutting a series of cross sections using the FIB and sequentially collecting EBSD data for each cross section.

Special sample holders are supplied as part of the package that restrict movements to 180° rotation between milling and image acquisition (EBSD mapping) position and thus eliminate the need for tilting the stage. After acquisition, the resulting data set can then be offline processed to analyze crystallographic properties of the sample in three dimensions. EBS3 control software is compatible with detectors from a number of vendors that are supported through a vendor specific plug-in.

EBS3 provides an easy step-by-step setup process and the ability the monitor the fully automated acquisition process. Data acquisition, storage and post-processing of images is managed in Projects. Each new Project represents an experiment on a sample at one particular area of interest. Multiple consecutive projects can be defined for the same sample. The setup process includes many options for enabling and defining sample preparation features like a protective layer, a rough cut and anti-shadow angles. After setup, the execution of the Project(s) automates the slicing and image acquisition process and can be left unattended. Status and progress of a running Project can be monitored and reviewed. Projects can be halted and resumed: the software can use existing fiducials for alignment. After completion of the automated run, all acquired project data is available for post-processing and further analysis.

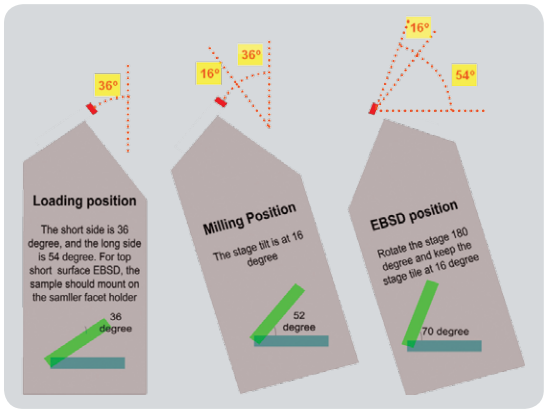
EBS3 incorporates a number of new features that further enhance the quality of data acquisition during the automated process: Rotational correction eliminates small errors that may occur from repeatedly rotating the sample between milling and acquisition position. Although proper FIB settings already minimize the milling damage impact at the surface, FIB Cleaning is a new feature that can be enabled to get a further improvement in the acquired EBSD data: after milling, the image area is first exposed to a low KV ion beam current that will reduce the effect of the beam on the surface.

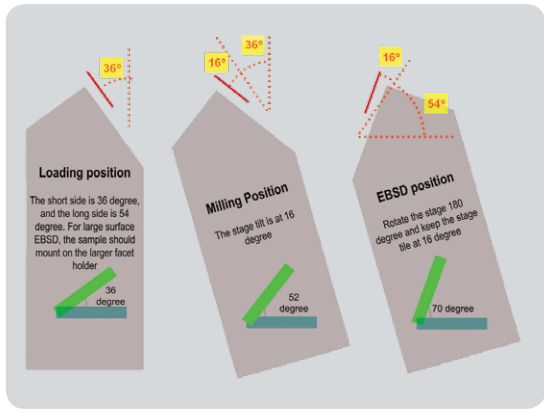
Non-conductive samples are accommodated by using several integrated features such as drift suppressed milling and charge neutralization mode. Low vacuum electron beam imaging is enabled for supporting Quanta 3D FEG and Versa 3D instruments enabling 3D imaging and analysis of an even more extensive range of samples.

KEY BENEFITS
Fully automated workflow.
Easy-to-use user interface.
Optimized sample holder.
Rotational correction.
Flexible fiducial support.
Low kV cleaning per slice.
Wide screen support.

Optimized sample holder for milling and acquisition

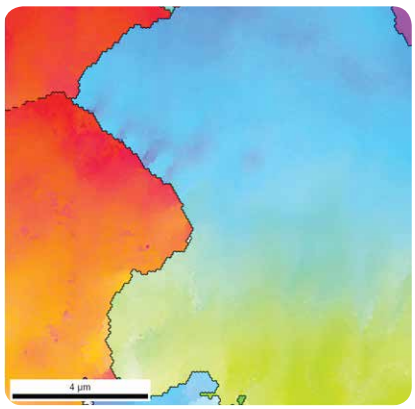
A dedicated sample holder facilitates the milling and acquisition of EBSD data by repeatedly rotating the sample 180° between the milling and EBSD mapping positions eliminating the need to tilt the stage. The holder can be used to analyze the long or the short side of the angle. The angles of the holder expose the surface side in parallel to the ion beam for milling and with an angle of 20° in the EBSD position allowing the surface to be exposed properly for EBSD data acquisition.

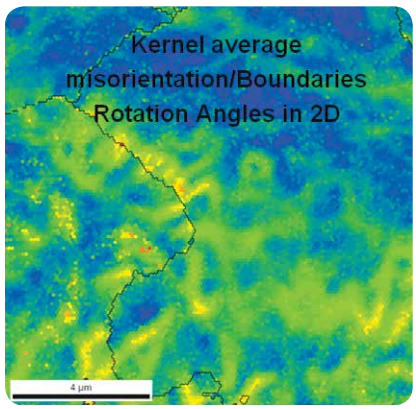


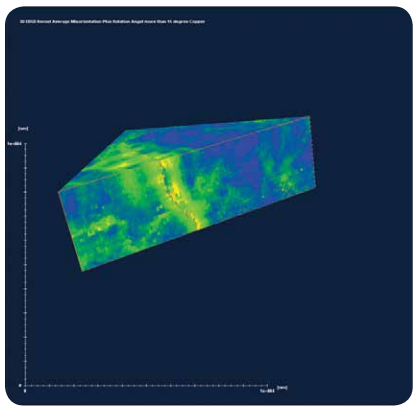


Examples

3D EBSD analysis of deformed copper. The first picture shows a 2D inverse pole figure (IPF) map of one of the slices. The crystal directions are parallel to y-direction for milling. The second picture shows local misorientation of the sample, which is calculated using the 3rd nearest neighbours and misorientation set to 50 in order to show the strain in the crystal. The intensity of red represents the amount of strain. The last picture shows a snapshot of a 3D animation sequence that shows the local misorientation. The animation is rendered using ResolveRT, one of the 3D visualization software packages of VSG (a FEI company)*.







*ResolveRT, Amira and Avizo are high-performance 3D visualization software packages from VSG (an FEI Company), and can be ordered separately. More information can be found at VSG3D.com.

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