

3D-orientation microscopy in a FIB-SEM : a new dimension of microstructure characterisation

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The presentation describes our recent progress in development, optimisation and application of a technique for the 3-dimensional high resolution characterisation of crystalline microstructures.

The technique is based on automated serial sectioning using a focused ion beam (FIB) and characterisation of the sections by orientation microscopy based on electron backscatter diffraction (EBSD) in a combined FIB-scanning electron microscope (SEM). The technique extends all the powerful features of 2-dimensional EBSD-based orientation microscopy into the third dimension of space. This allows new parameters about the microstructure to be obtained, for example the full crystallographic characterisation of all kinds of interfaces, including the morphology and the crystallographic indices of the interface planes.

The technique is illustrated by a number of examples, including the characterisation of pearlite colonies in a carbon steel, of twins in pseudo-nanocrystalline NiCo thin films and the description of deformation patterns formed under nano-indentations in copper single crystals.

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