Extending Line-Profile-Analysis to Textured Materials and neutron-Diffraction

Tamás Ungár
Materials Physics Department, Eötvös University Budapest,
Pázmány Péter sétány 1/A, 1117-Budapest, Hungary

Abstract.

X-ray line profile analysis is a powerful tool for characterizing the microstructure of crystalline materials in terms of (i) grain size, (ii) dislocation structure and (iii) planar defects either in bulk polycrystalline samples or on the single grain level. It can also be carried out on the *hkl* planes corresponding to the same texture component or the same crystallographic orientation fiber. It is shown that in textured polycrystalline materials or in thin films or multilayers X-ray line profiles measured on planes corresponding either to the main or the minor texture components can provide the Burgers vector population and dislocations densities in the different texture components separately. The experimental technique is outlined for textured specimens and the extended multiple convolutional whole profile method (eCMWP) will be presented for its capacity to determine the substructure pertaining to different texture components in textured samples. The angular or spatial resolution of recently commissioned neutron beamlines at spallation neutron sources open up new scopes for the characterization of microstructures by the method of neutron line profile analysis. The challenges and possibilities provided by neutron line profile analysis will be discussed on the basis of first experimental results.