

Partial dislocation densities and character in different slip modes from X-ray powder diffraction patterns

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X-ray line profile analysis proved to be a powerful tool to determine the microstructure in plastically deformed materials in term of subgrain size, dislocation density and arrangement, planar defects and long-range internal stresses [1,2]. In the present work we show that partial dislocation densities and dislocation arrangements related to different slip modes or slip systems can be determined separately when the dislocation contrast factors have different hkl dependence. The newly developed procedure, implemented into the convolutional multiple whole profile (CMWP) line profile analysis procedure, will be shown to work on diffraction patterns of plastically deformed and neutron irradiated samples of a Zr-2.5Nb alloy and MD simulated copper crystals plastically deformed by uniaxial compression.

Keywords: slip-modes, dislocation character, plastic deformation, neutron irradiation, X-ray line broadening

Acknowledgment: This work was funded by an EPSRC Leadership Fellowship [EP/I005420/1] and by the EPSRC program grant MIDAS (EP/S01702X/1) for the study of irradiation damage in zirconium alloys. CPR gratefully acknowledges funding from a University Research Fellowship of The Royal Society.

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