THE DISLOCATION MODEL OF STRAIN ANISOTROPY

Tamás Ungár
Department of Materials Physics, Eötvös University Budapest,
H-1518, POB 32, Budapest Hungary

Strain anisotropy means that neither the FWHM nor the integral breadths in a Williamson-Hall plot, nor the Fourier coefficients in the Warren-Averbach plot are monotonous functions of $\sin\theta$ or $(\sin\theta)^2$, respectively. The observation goes back to the pioniering work of Stokes and Wilson [1], who even gave the first dislocation based interpretation to the phenomenon. Dislocations in the forties were, however, only a concept, vaguely proved by etch-pits, not having been seen until about 1954 in one of the first operating transmission electron microscope of the Oxford group. This is probably the reason why in the ingenious papers of Warren [2], and Warren and Averbach [3] in the late forties and early fifties about strain broadening, dislocations do not appear. Strain anisotropy pops up with more emphasis in crystallographic studies, however, more like a nuisance than a virtue, cf. [4], since it disturbes structure determination, especially by the Rietveld method. The anisotropic effect of dislocations in X-ray line broadening appears again in the works of Krivoglaz [5] and Wilkens [6], who were, however, metallurgists therefore, did not care too much about strain anisotropy in whole diffraction patterns. A breakthrough in the interpretation of strain anisotropy based on a dislocation model could have come by the three excellent consecutive papers of Kuzel and Klimanek [6-8]. They studied the active slip systems in hexagonal crystals, a rather complicated and not really conclusive task in order to convince readers about the usefulness of a new approach in X-ray line broadening. The dislocation model of strain anisotropy in cubic crystals seems to have been more convincing, probably because it is so much simpler than in the case of hexagonals [9-11]. Now it is generally accepted and incorporated into whole profile methods by using uniform strain profiles scaled for *hkl* dependence by dislocation contrast factors [10-16]. The application of the model will be illustrated by dislocated cubic, orthorhombic and hexagonal crystals.

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