Characterization of nanocrystalline ceramics by electron diffraction

János L. LÁBÁR

MTA EK MFA, e-mail: labar.janos@energia.mta.hu

The computer program ProcessDiffraction is an efficient tool to get out most of the information from electron diffraction patterns recorded in a transmission electron microscope (TEM). Grains with size over 1 μm can be treated as "single-crystals" and their orientation can be determined, which facilitates examination of grain boundaries by determining their misorientation and tilting the sample into an orientation where both neighbors have zone axes. Phase composition and fraction of specially textured component can be determined for regions of nanocrystalline (with grain size up to a few 10 nm range) thin lamellae (prepared for TEM). Short range order can be determined for both nanocrystalline and amorphous components that can provide diffraction separated from the rest of the sample. Examples will be shown on nanocrystalline Ti-AlN ceramics.

[1] J.L. Lábár, M. Adamik, B.P. Barna, Zs. Czigány, Zs. Fogarassy, Z.E. Horváth, O. Geszti, F. Misják, J. Morgiel, G. Radnóczi, G. Sáfrán, L. Székely and T. Szüts (2012): "Electron Diffraction Based Analysis of Phase Fractions and Texture in Nanocrystalline Thin Films, Part III: Application Examples", Microsc. Microanal. 18, 406–420 and reference in it

[2] Ákos K. Kiss and János L. Lábár (216): "Determining Projections of Grain Boundaries from Diffraction Data in Transmission Electron Microscope", Microsc. Microanal. 22, 551–564 and reference in it

[3] János L. Lábár, Partha Pratim Das (2017): "Pattern center and distortion determined from faint, diffuse electron diffraction rings from amorphous materials", Microsc. Microanal. , in press