

Texture-structure-microstructure-phase analysis of multi-phased ceramics and films using x-ray and neutron diffraction: examples of sinter-forged Bi₂Te₃-Bi₂Te₂, Melt Textured Growth Y-Ba-Cu-O and nano-Si

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The controlled development of texture in polycrystalline materials appears to be more and more essential in ceramic and thin film processing, since potential applications require materials with macroscopic properties comparable to the intrinsic anisotropic tensors of the crystal structures. Texture analysis is consequently recognized as a really important tool in the characterisation of oriented samples. However, a quantitative texture analysis of these materials is usually not a simple task. In most cases, the diffraction spectra are very complex with many partially or fully overlapping diffraction peaks and with several crystallographic phases. To overcome this problem, the combination¹ of Rietveld, WIMV and Popa approaches, as implemented in the MAUD software (Materials Analysis Using Diffraction)², permits a comprehensive new approach to crystal structure-texture-microstructure-phase-stress analysis. In this study, we report the application of this method to different ceramic materials with different textures, crystallographic structures, microstructures ...

We demonstrate here the efficiency and reliability of iterative combination of algorithms for structure-phase determination, microstructure and OD calculation for oxide ceramics and silicon nanostructured films.

1 Chateigner D (2004) "Combined Analysis",
<http://www.ecole.ensicaen.fr/~chateign/texture/combined.pdf>

2 Lutterotti L, Matthies S, Wenk H R, in: J.A. Szpunar (Ed.), Textures of Materials, vol. 2, NRC Research Press, Ottawa, 1999, 1599