MODIFICATION OF LINE PROFILE ANALYSIS METHODS FOR THIN FILM MATERIALS STUDY

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Line Profile Analysis is proved to be a powerful tool for the analysis of the microstructure of powders, polycrystalline and, recently, nanocrystalline materials providing valuable information about crystalline size and defect ensemble parameters. In the field of X-ray characterization of epitaxial thin films, the similar parameters were traditionally obtained with the help of the fitting procedures based on the dynamical diffraction theory [1]. This approach is valid for the defect-free systems, however, in many systems of interest the defects are present due to the design stage, e.g. misfit dislocations due to the mismatch stress relaxation, and effect drastically the distribution of the diffracted X-ray radiation [2].

In the present contribution, the modification of dynamical diffraction theory and line profile analysis methods necessary for characterization of defective thin films will be discussed. The methods of the dislocation treatment are compared within the framework of the line profile analysis and thin films characterization. An example of compositionally graded epitaxial film characterization based on the dislocation density analysis is presented [3].

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