

Title: Microstructure and properties of multiferroic complex oxide thin films prepared by pulsed laser deposition method

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Abstract:

In the frame of this thesis, structure, microstructure, and real structure of multiferroic epitaxial layers of LuFeO<sub>3</sub> were studied by means of X-ray reflectivity and X-ray diffraction. In theoretical part the theory of X-ray scattering on crystalline layers is described. Standard description of X-ray reflectivity on series of rough layers is presented. Moreover, a model of X-ray scattering on mosaic layer is described.

For experimental part of the work three samples were prepared by pulsed laser deposition method. First sample on sapphire substrate (Al<sub>2</sub>O<sub>3</sub>), second on platinum layer deposited on sapphire substrate and third on yttrium stabilized zirconia substrate. From the X-ray reflectivity curves the parameters such as layer thickness, interface roughness, surface roughness and material density, were determined. By analysing measured reciprocal space maps, lattice parameters and mosaic model parameters, such as mean mosaic block size, mosaic block size distribution, mosaic block misorientation and residual microstrain, were determined for each sample. Surface morphology of the layers was also studied by atom force microscopy and scanning electron microscopy.

Keywords: multiferroics, X-ray diffraction, X-ray reflectivity