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Structural study of thin-film $PbTiO_3$-$CoFe_2O_4$ composition spreads LEONID A. BENDERSKY, Materials Science and Engineering Laboratory, National Institute of Science and Technology, Gaithersburg, Maryland 20899 USA, M. MURAKAMI, I. TAKEUCHI, Department of Materials Science and Engineering and Center for Superconducting Research, University of Maryland, College Park, Maryland 20742, USA — Multiferroic materials exhibiting magnetoelectric (ME) effects are of great interest for novel devices. In multiphase systems, the ME effect arises from the elastic interaction of ferromagnetic and ferroelectric phases. Recently we studied properties and structures of multiferroic $PbTiO_3$ (PTO) and $CoFe_2O_4$ (CFO) thin films produced by a composition-spread technique. The compositional spread was achieved by PLD of a superlattice of pure PTO and CFO. Here we report results of cross-sectional TEM studies, which can be summarized as following: a. For all compositions the microstuctures yielded pseudo-binary two phases equilibrium of PTO and CFO, and the phases are epitaxial to each other and to a MgO substrate; b. Morphology of the phases strongly depends on a thickness of the deposited superlattice; c.The most pronounced ME effect was found for a pancake-like morphology; d.Diffusional re-arrangement of layers during the deposition results in the solubility of CFO in PTO, which drastically reduces ferroelectric Curie temperature of PTO.

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