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Structural Magnetic Properties of Multiferroic (BiFeO3)1−x(PbTiO3)x Ceramics

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Abstract : A series of multiferroic (BiFeO3)1−x(PbTiO3)x [x= 0, 0.1, 0.2, 0.3, 0.4 and 0.5] solid solution ceramics were synthesised by conventional solid-state reaction method. Well crystalline phase has been optimized at sintering temperature of 950°C for 2 hours. X rays diffraction studies of these ceramics revealed the existence of a morphotropic phase boundary (MPB) region in this system, which exhibits co-existence of rhombohedral and tetragonal phase with a large tetragonality (c/a ratio) in the tetragonal phase region. The average grain size of samples was found to be between 1-1.5 µm. The M-H curve revealed the BiFeO3 (BFO) as antiferromanetic material whereas, induced weak ferromagnetism was observed for (BiFeO3)1−x(PbTiO3)x composites with x=0.1, 0.2, 0.3, 0.4 and 0.5 at temperature of 5 K. The results evidenced the destruction of a space-modulated spin structure in bulk materials, via substituent effects, releasing a latent magnetization locked within the cycloid. Relative to unmodified BiFeO3, modified BiFeO3-PbTiO3 -based ceramics revealed enhancement in the electric-field-induced polarization.

Keywords : BiFeO3)1−x(PbTiO3)x ceramic, multiferroic, SQUID, magnetic properties
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