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Synchrotron X-ray Study of Thin Film Samarium Doped BiFeO3 at the Morphotropic Phase Boundary[1] SAMUEL EMERY, BARRETT WELLS, University of Connecticut, CHING-JUNG CHENG, NAGARAJAN VALANOOR, University of New South Wales, DAISUKE KAN, ICHIRO TAKEUCHI, University of Maryland — Samarium doped bismuth ferrite (BSFO) is a good lead free candidate for piezoelectric applications. For Sm concentrations of ∼14%, BSFO is at a morphotropic phase boundary (MPB) between two structural phases much like lead zirconium titanate (PZT). We have conducted a high resolution synchrotron x-ray diffraction study of Sm doped BiFeO3 films at a composition near the MPB. Films of varying thicknesses were studied over a temperature range of 25C to 700C. We found that the mixed phases associated with the MPB vary with temperature and thickness, indicating that they undergo a transition near 275C. Fundamental lattice constants were measured as a function of temperature; additionally this allowed us to probe structural twins. Also, thermal history dependence was found that indicates a chemical change occurring above film growth temperature.

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