

Abstract Submitted
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Systematic investigation of morphotropic phase boundaries in rare-earth doped BiFeO₃ DAISUKE KAN, SHIGEHIRO FUJINO, Univ of Maryland, VARTHARAJAN ANBUSATHAIAH, VALANOOR NAGARAJAN, University of New South Wales, MAKOTO MURAKAMI, SUNGHWAN LIM, ARUN LUYKX, DWIGHT HUNTER, MANFRED WUTTIG, ICHIRO TAKEUCHI, Univ of Maryland — We have investigated structural and ferroelectric properties of BiFeO₃ doped with rare-earth (RE) elements La, Sm, Gd, Dy, Lu using thin film composition spreads. Previously, we had reported on discovery of a morphotropic phase boundary in (Bi,Sm)FeO₃.^[1] Thin film composition spreads of (Bi,RE)FeO₃ were fabricated by combinatorial pulsed laser deposition. From scanning xray diffraction, rhombohedral to pseudo-orthorhombic structural transitions are observed. The composition at which the structural transition takes place changes with radii of the RE element: the smaller the ion, the smaller the substitution concentration. This shows that the chemical pressure effect is the cause of the transition. The ferroelectric - antiferroelectric transition is observed for RE doped BiFeO₃ with smaller radii than the Bi³⁺ ion at the compositions which coincide with the structural transition for each RE dopant. The detailed correlation between the structural properties and ferroelectric and piezoelectric properties will be discussed. This work is supported by DMR, NSF DMR, ARO and the W. M. Keck Foundation.
^[1] S. Fujino et al., APL 92, 202904 (2008).

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