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Neutron diffraction and reflectometry measurements of the magnetic structure of $BiFeO_3/La_xBi_{1-x}FeO_3$ superlattices COLIN HEIKES, NIST - Natl Inst of Stds Tech , JULIA MUNDY, University of California: Berkeley, ZHE WANG, Cornell University, R. RAMESH, University of California: Berkeley, DARRELL SCHLOM, Cornell University, WILLIAM RATCLIFF, NIST - Natl Inst of Stds Tech — We report the growth of $BiFeO_3/La_xBi_{1-x}FeO_3$ superlattices as well as the results of neutron diffraction and reflectometry measurements of the magnetic structure of these films. We have synthesized these superlattice films using reactive oxygen molecular beam epitaxy (MBE) with a variety of La-doping concentrations in the La-doped BiFeO3 layers. We have made a range of films of the structure y*[n*$BiFeO_3$/m*$La_xBi_{1-x}FeO_3$]/substrate where n is the number of unit cells of BiFeO3, m is the number of unit cells of $La_xBi_{1-x}FeO_3$, x is the La doping concentration, y is the number of superlattice repeats, and our substrate is either Nb:$SrTiO_3$ (100), $SrTiO_3$(100), or $TbScO_3$(110). X-ray diffraction and TEM measurements illustrate the high crystal quality of these films with this growth technique. We have performed both diffraction and reflectometry measurements at the NCNR at NIST. Our neutron diffraction measurements show an unusual magnetic field dependence of the magnetic structure for certain combinations of n, m, x, y, and substrate choice.

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