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Investigation of Electric Field Control of Antiferromagnetic Domains in Epitaxial BiFeO3 Thin Films Using Neutron Diffraction W. RATCLIFF, National Institute of Standards and Technology, Gaithersburg, MD 20899, V. ANBUSATHAIAH, T. GAO, Deparment of Materials Science and Engineering, University of Maryland, College Park, MD 20424, P.A. KIENZLE, National Institute of Standards and Technology, Gaithersburg, MD 20899, I. TAKEUCHI, Deparment of Materials Science and Engineering, University of Maryland, College Park, MD 20424 — BiFeO3 (BFO) is a multiferroic which displays both ferroelectric and magnetic order at room temperatures. Thin films possess a simple G-type antiferromagnetic order. In the bulk, this ordering takes on an additional long-wavelength modulation in the form of a spiral [1]. Recent neutron diffraction results have revealed that it is possible to recover a modulated magnetic structure in thin films which is strongly dependent on the orientation of the substrate on which the film is grown [1]. Based on this, BFO thin films were deposited on a vicinal SrTiO3 substrate. PFM measurements demonstrate that a ferroelectric monodomain was achieved. New neutron diffraction results show that it is possible to change the population of magnetic domains in such films through the application of an electric field (which also switches the ferroelectric domain state). Based on these results, magneto optic Kerr effect (MOKE) measurements were performed on patterned pads of exchanges coupled Co film deposited on top of the BFO films. The results of these measurements will be discussed in the context of device applications. [1] Lee Seongsu; Choi Taekjib; Ratcliff W. II; et al., Phys. Rev. B 78, 100101 (2008); Ratcliff William II; Kan Daisuke; Chen Wangchun; et al., Advanced Functional Materials 21, 1567 (2011).

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