Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Reversible Magnetoelectric Control of Exchange Coupling in Monodomain $BiFeO_3$ Heterostructures[1] J IRWIN, W SAENRANG, Univ of Wisconsin, Madison, B.A. DAVIDSON, CNR-Istituto Officina dei Materiali, Trieste, Italy, J.E. PODKAMINER, KJ REIERSON, Univ of Wisconsin, Madison, F MACCHEROZZI, S DHESI, Diamond Light Source, Harwell Campus, Didcot, UK, J. W. FREELAND, Advanced Photon Source, Argonne National Laboratory, US, M.S. RZCHOWSKI, C. B. EOM, Univ of Wisconsin, Madison — The electric field control of ferromagnetism has exciting applications in spintronic devices such as magnetic tunnel junctions. We investigate reversible rotation of the magnetization of a Co overlayer on a heterostructure with a monodomain thin film of the multiferroic $BiFeO_3$ (BFO). For different electric polarization directions of the BFO film we observe a rotation in Co magnetization direction by photoelectron emission microscopy (PEEM). This effect is robust over at least 100 cycles of the BFO electric polarization. According to anisotropic magnetoresistance (AMR) and magneto-optic Kerr effect (MOKE) measurements performed at room temperature, the easy magnetic direction for the Co layer rotates in plane when the electric polarization of the BFO is switched. Additionally, X-ray linear dichroism (XLD) measurements verify the presence of a magnetoelectric effect in the BFO and suggest magnetic coupling between the BFO and Co layers.

[1]This work is supported by the Army Research Office under Grant No. W911NF-10-0382

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Date submitted: 06 Nov 2015 Electronic form version 1.4