

Abstract Submitted
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Magnetoelectric Control of Exchange Coupling in Monodomain BiFeO₃ Heterostructures¹ JULIAN IRWIN, W. SAENRANG, B. DAVIDSON, S. RYU, S.-B. BAEK, C.B. EOM, M.S. RZCHOWSKI, Univ. of Wisconsin, Madison, J. FREELAND, Argonne National Laboratory, USA — The electric field control of magnetization via the exchange bias coupling of a ferromagnetic and antiferromagnetic orderings has exciting applications in spintronic devices such as magnetic tunnel junctions. We investigate the exchange coupling between the monodomain multiferroic BiFeO₃(BFO) thin film [1] and a ferromagnetic Co layer. Recently, X-ray magnetic circular dichromism (XMCD) has been used to observe a $\sim 20^\circ$ rotation in the magnetization of the Co when the electric polarization of the BFO is reversed [2]. Due to the formation of an antiferromagnetic surface “dead layer” at high temperatures, observed using X-ray linear magnetic dichromism, this rotation is only seen at temperatures below ~ 150 K. Here we investigate the exchange coupling using anisotropic magnetoresistance (AMR) measurements that detect changes in the magnetization of the Co layer. Our approach using AMR can be applied more generally to study exchange coupling in multiferroic systems.

[1] S.H. Baek et al., “Ferroelastic Switching for Nanoscale Nonvolatile Magnetoelectric Devices” *Nature Materials*, 9, 309 (2010).

[2] W. Saenrang et al, “Magnetoelectric Control of Exchange Coupling in Monodomain BiFeO₃ Heterostructures,” in preparation

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