Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Tuning the effective anisotropy in a voltage-susceptible exchange bias heterosystem[1] WILL ECHTENKAMP, MIKE STREET, ATHER MAHMOOD, CHRISTIAN BINEK, University of Nebraska-Lincoln — Voltage and temperature tuned ferromagnetic hysteresis is investigated by SQUID and Kerr-magnetometry in a thin film heterostructure of a perpendicular anisotropic Co/Pd ferromagnet exchange coupled to the magnetoelectric antiferromagnet Cr_2O_3. An abrupt disappearance of exchange bias with a simultaneous more than two-fold increase in coercivity is observed and interpreted as a competition between the effective anisotropy of Cr_2O_3 and the exchange coupling energy between boundary magnetization and the adjacent ferromagnet. The effective anisotropy energy is given by the intrinsic anisotropy energy density multiplied by the effective volume separated from the bulk through a horizontal antiferromagnetic domain boundary. Kerr measurements show that the anisotropy of the interfacial Cr_2O_3 can be tuned, isothermally, and in the absence of an external magnetic field, by application of an electric field. A generalized Meiklejohn-Bean model accounts for the change in exchange bias and coercivity as well as the asymmetric evolution of the hysteresis loop. In support of this model, the reversal of the boundary magnetization is experimentally confirmed as a contribution to the magnetic hysteresis loop.

[1]This project was supported by NERC a subsidiary of SRC, through CNFD, an SRC-NRI Research Center under Tasks ID 2398.001 and 2587.001, by C-SPIN, a SRC program, sponsored by MARCO and DARPA, and by NSF through Nebraska MRSEC DMR-1420645.

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Date submitted: 11 Nov 2016 Electronic form version 1.4