Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Increased operational temperature of Cr_2O_3-based spintronic devices[1] MICHAEL STREET, WILL ECHTENKAMP, TAKASHI KOMESU, SHI CAO, University of Nebraska-Lincoln, JIAN WANG, University of Saskatchewan, PETER DOWBEN, CHRISTIAN BINEK, University of Nebraska-Lincoln — Spintronic devices have been considered a promising path to revolutionizing the current data storage and memory technologies. This work is an effort to utilize voltage-controlled boundary magnetization of the magnetoelectric chromia (Cr_2O_3) to be implemented into a spintronic device. The electric switchable boundary magnetization of chromia can be used to voltage-control the magnetic states of an adjacent ferromagnetic layer. For this technique to be utilized in a spintronic device, the antiferromagnetic ordering temperature of chromia must be enhanced above the bulk value of T_N = 307K. Previously, based on first principle calculations, boron doped chromia thin films were fabricated via pulsed laser deposition showing boundary magnetization at elevated temperatures. Measurements of the boundary magnetization were also corroborated by spin polarized inverse photoemission spectroscopy. Exchange bias of B-doped chromia was also investigated using magneto-optical Kerr effect, showing an increased blocking temperature from 307K. Further boundary magnetization measurements and spin polarized inverse photoemission measurements indicate the surface magnetization to an in-plane orientation from the standard perpendicular orientation.

[1]This project was supported by the SRC through CNFD, an SRC-NRI Center under Task ID (2398.001) and by C-SPIN, part of STARnet, sponsored by MARCO and DARPA (No. SRC 2381.001)

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Date submitted: 05 Nov 2015 Electronic form version 1.4