

Abstract Submitted
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Enhanced resistivity in voltage-controlled exchange-bias devices¹

ATHER MAHMOOD, WILL ECHTENKAMP, MIKE STREET, CHRISTIAN BINEK, University of Nebraska-Lincoln, CHUN KWAN, JONATHAN BIRD, State University of New York at Buffalo, PROF. CHRISTIAN BINEK TEAM, PROF. JONATHAN BIRD COLLABORATION — Manipulation of magnetism by electric field is important for energy-efficient devices in information technology. Voltage-controlled switching of magnetization is manifested through exchange bias (EB) and promises non-volatile spintronic memory and logic devices. Earlier, we demonstrated robust isothermal voltage control of EB near room temperature using a heterostructure of Co/Pd thin film and an exchange coupled bulk single crystal of the antiferromagnetic magnetoelectric Cr₂O₃ (Chromia). A major obstacle in the display of EB in patterned Chromia thin-film devices is significant leakage current at high electric fields. Electrical measurements on patterned devices and conductive Atomic Force Microscopy of Chromia thin-films reveal the nature of defects which form conducting paths, impeding the application of sufficient voltage. By replacing the base metal Pd with Pt, we demonstrate the mitigation of conduction paths due to reduced lattice mismatch of Chromia over Pt. X-ray diffraction show the suppression of 60 degree domains and electrical measurements on patterned devices confirm the enhanced resistivity.

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Ather Mahmood
University of Nebraska-Lincoln

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