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Voltage Controlled Exchange Bias in a Cr_2O_3 based heterostructure[1] WILL ECHTENKAMP, MIKE STREET, CHRISTIAN BINEK, Univ of Nebraska - Lincoln — Controlling magnetism by electrical means is a key challenge in the field of spintronics, and electric control of exchange bias is one of the most promising routes to address this challenge. Isothermal electric control of exchange bias has been achieved near room temperature using bulk, single crystal, magnetoelectric Cr_2O_3, which has a voltage controlled net magnetization at the (0001) surface[2,3]. Voltage control of magnetism in a Cr_2O_3 thin film system has presented significant challenges. In this study we explore the electric control of exchange bias in an all-thin-film system of decreasing chromia film thickness with significant implications for scalability of ultra-low power memory and logical devices. Cross-sectional HRTEM indicates that grain boundaries in the metallic bottom electrode propagate into the Cr_2O_3 thin film with detrimental effects on leakage currents. We address this issue via a three-step growth method for the deposition of epitaxial Pd on sapphire. The resulting microstructure of the films is analyzed by reflection high-energy electron diffraction, tunneling electron microscopy and x-ray diffraction.

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Will Echtenkamp
Univ of Nebraska - Lincoln

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