Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Magnetoelectric effects in Fe3O4 thin films JARED WONG, ADRIAN SWARTZ, RENJING ZHENG, ROLAND KAWAKAMI, Dept. of Physics and Astronomy - University of California, Riverside — Recently, there has been great interest in voltage-induced manipulation of magnetic properties inside magnetic materials. One attractive avenue is using magnetic oxides, which could be susceptible to manipulation of magnetic properties by electric fields at the interface and/or directly altering the electronic behavior within strongly correlated systems, for example. Magnetite (Fe3O4) is quite interesting because it exhibits many interesting properties such as ferrimagnetism, ferroelectricity (at low temperatures) and a metal-insulator phase transition near 120 K known as the Verwey transition. Single crystal Fe3O4 samples are deposited through reactive molecular beam epitaxy (MBE) on MgO (001) substrates and the structural quality is confirmed through XRD, RHEED, and LEED. Magnetic properties are examined through magneto-optic Kerr effect (MOKE) measurements and 4-probe I-V / Van Der Pauw measurements were used to determine the electronic properties. Samples are incorporated into an electrically gated structure by the addition of a dielectric layer and metallic top electrode and we report our results and observations of voltage-induced manipulation of the magnetic properties inside thin films of Fe3O4.

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Date submitted: 10 Nov 2011 Electronic form version 1.4