Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Magnetoelectric coupling at the interface of manganite thin films grown on strontium titanate MATTHEW MARSHALL, FRED WALKER, CHARLES AHN, CRISP, Dept. of Applied Physics, Yale University, New Haven, CT, 06520 — Oxide heterostructures of PbZr0.2Ti0.8O3/La0.8Sr0.2MnO3/SrTiO3 (PZT/LSMO/STO) have been shown to undergo a large charge-driven magnetoelectric coupling. Switching the polarization state of the ferroelectric PZT layer induces a spin reconstruction in the top atomic layer of the magnetic LSMO layer, changing from ferromagnetic to antiferromagnetic ordering [1]. In this work, the LSMO layer is several unit cells thick. In order to enhance this magnetic switching effect, we have reduced the thickness of the active LSMO layer, replacing part of the LSMO film with LaMnO3 (LMO), a bulk antiferromagnetic insulator. To carry out this approach, we use oxide molecular beam epitaxy (MBE) to control the composition of thin films of LMO and LSMO/LMO heterostructures on SrTiO3(001) with atomic layer precision. Heterostructures grown in this way show a large deviation from the expected behavior for a simple combination of the individual components. We compare measurements of the magnetization for epitaxial LMO on SrTiO3 and heterostructures of LSMO/LMO grown on SrTiO3. Using this approach, one can optimize the properties of the ferromagnetic layer and improve the magnetoelectric switching properties of the PZT/LSMO/STO system. [1] CAF Vaz, et al. Phys. Rev. Lett. 104, 127202 (2010); doi:10.1103/PhysRevLett.104.127202

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Date submitted: 11 Nov 2011 Electronic form version 1.4