Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Complex interactions between structural, magnetic and electronic properties of epitaxial thin films of the bilayer manganite $\mathbf{La_{1.2}Sr_{1.8}Mn_2O_7}$ YAYOI TAKAMURA, YURI SUZUKI, UC-Berkeley, JOSTEIN GREPSTAD, NTNU, RAJESH CHOPDEKAR, Cornell Univ., ANN MARSHALL, Stanford Univ., HONG ZHENG, JOHN MITCHELL, Argonne National Lab — The bilayer manganite $La_{1.2}Sr_{1.8}Mn_2O_7$ resides within the Ruddlesden-Popper (RP) family of materials and consists of interleaved blocks of two metallic/ferromagnetic (La,Sr)MnO_3 layers and one insulating (La,Sr)O layer. We have grown epitaxial thin films on (110)-oriented $SrTiO_3$ substrates by pulsed laser deposition with the c-axis aligned in the plane of the film. These in-plane aligned films are a model system for probing the anisotropic magnetic and electronic properties of this bilayer manganite. The films display similar properties to their bulk counterparts with the easy direction lying within the $a-b$ planes and coincident metal/insulator and ferromagnet/paramagnet transitions occurring at a suppressed T_c $\sim$90K (120K for bulk). While the magnetic properties are robust to the presence of defects, the electronic properties are highly sensitive to these defects, which include amorphous regions, antiphase boundaries and trace amounts of other RP phases.

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Date submitted: 30 Nov 2004 Electronic form version 1.4