Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Instrinsic Insulators at the Surfaces of Layered Ferromagnetic Manganites J.W. FREELAND, Advanced Photon Source, Argonne National Laboratory, K.E. GRAY, E. BADICA, J.F. MITCHELL, Materials Science Division, Argonne National Laboratory, J.J. KAVICH, R.H. KODAMA, Department of Physics, University of Illinois at Chicago — To explore loss of ferromagnetic order at the surfaces of manganites, we brought together a powerful combination of two surface probes, tunneling and polarized x-ray interactions, to study the intrinsic electronic and magnetic surface states of a layered manganite, $La_{2-2x}Sr_{1+2x}Mn_2O_7$, that is ferromagnetic and conducting in the bulk. These probes present clear evidence for an intrinsic insulating nonferromagnetic surface layer atop adjacent ferromagnetic subsurface layers. The presence of a nonferromagnetic surface layer of one bilayer thickness was observed with x-ray resonant magnetic scattering (XRMS), and point contact tunneling results show this layer is insulating (0.6 eV band gap), in agreement with the expectations of the double-exchange model. Temperature dependence shows the magnetization in the sub-surface bilayer retains the bulk value close to T_c. In addition the nonferromagnetic surface layer shows a linear response in fields up to 7T, consistent with antiferromagnetic order in the surface bilayer. This research, including the use of the Advanced Photon Source, was supported by the U.S.Department of Energy, Office of Science, under Contract No. W-31-109-Eng-38.

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Date submitted: 30 Nov 2004 Electronic form version 1.4