

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Studies of the intrinsic inhomogeneity and pseudogap phenomena of La<sub>0.7</sub>Ca<sub>0.3</sub>MnO<sub>3</sub> epitaxial films using spin-polarized (SP) scanning tunneling microscopy (STM)<sup>1</sup>** C. R. HUGHES, J. SHI, A. D. BEYER, N.-C. YEH, Phys. Dept., Caltech, Pasadena, CA 91125 — Spatially resolved tunneling spectra of La<sub>0.7</sub>Ca<sub>0.3</sub>MnO<sub>3</sub> (T<sub>c</sub> = 260K) epitaxial films are studied using STM under varying temperature, magnetic field, and the degree of spin polarization in the tunneling currents. With both regular and magnetic STM tips, conductance inhomogeneity related to the phase separation nature of manganites is observed below the Curie temperature and in zero fields, and the inhomogeneity decreases with magnetic field and above the Curie temperature. On the other hand, with magnetic tips the field-dependent tunneling spectra may be quantitatively explained by SP tunneling in a spin-valve configuration. In addition, a nearly temperature independent pseudogap ( $\sim 0.4$  eV) and a larger energy gap ( $\sim 0.6$  eV) at low temperatures are found; the former disappears upon the application of magnetic field, and the latter may be attributed to a surface ferromagnetic insulator phase because of the manifestation of spin filtering effect under SP tunneling in opposite field orientations.

<sup>1</sup>This work was supported by NSF under Caltech/CSEM.

C. R. Hughes  
Phys. Dept., Caltech, Pasadena, CA 91125

Date submitted: 19 Nov 2009

Electronic form version 1.4