Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Competing Dielectric Phases and Detailed Balance in Thin Film Manganites[1] PATRICK MICKEL, University of Florida, AMLAN BISWAS, ARTHUR F. HEBARD — Mixed-valence manganites exhibit a rich variety of crystallographic, electronic, and magnetic phases that compete in phase-separated ground states. We present frequency-dependent measurements of the complex capacitance of thin $La_{1-y}Pr_yCa_{0.33}MnO_3$ films together with an analysis that enables the simultaneous characterization of the competing paramagnetic insulating and the charge-ordered insulating phases. Resistance measurements in thin films are incapable of distinguishing these phases. Our analysis provides the individual time-scales and relative amplitudes of each phase at fixed temperatures in the range 100K-300K, allowing the determination of the activation energies and transition temperatures of each phase. Analysis of the time-scales and the relative proportions of each phase uncover a detailed balance equation describing the dynamic conversion between the phases during the polarization process. The competition of these dielectric phases is also studied as a function of external strain and magnetic field, demonstrating tunable dielectric constants and magnetic anisotropy in their transition temperatures.

[1]Research supported by the NSF under grant number DMR 0704240

Patrick Mickel
University of Florida

Date submitted: 20 Nov 2009 Electronic form version 1.4