Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Tuning magnetic and electronic properties of $(La_{1-x}Pr_x)_{0.67}Ca_{0.33}MnO_3$ thin films by composition spread deposition and electrolyte gating XIAOHANG ZHANG, Y.G. LIANG, S. FACKLER, J.-M. SHIN, ICHIRO TAKEUCHI, Department of Materials Science and Engineering, University of Maryland, A.T. N'DIAYE, E. ARENHOLZ, Lawrence Berkeley National Laboratory — The magnetic and electronic properties of mixed-valence manganites are known to be sensitive not only to chemical doping but also to oxygen concentration. However, it is difficult to consistently attain exactly the same set of deposition conditions and treatment history for samples that are fabricated individually. In order to perform systematic studies on each of the two effects, we fabricated epitaxial $(La_{1-x}Pr_x)_{0.67}Ca_{0.33}MnO_3$ (LPCMO) composition spread thin films with the Pr concentration changing continuously across 1 cm to ensure that all the sample segments of interest experience the same processing history. X-ray magnetic circular dichroism (XMCD) and electronic transport measurements indicated that the Curie temperatures and the metal-insulator transition temperatures change continuously from $\sim$ 260 K to $\sim$ 120 K as the Pr concentration is varied from 0 to 0.33. Systematic comparison between experimental data obtained on as-grown and post-annealed samples reveals the role of oxygen in the observed magnetic and electronic transitions. Moreover, changes in the magnetic and electronic properties of LPCMO films under electrolyte-gating have also been observed. A proposed mechanism to explain the effect will be discussed.

Xiaohang Zhang
University of Maryland

Date submitted: 14 Nov 2014 Electronic form version 1.4