Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Tuning out-of-plane strain in epitaxial La[1-x]Sr[x]MnO[3] thin films with noble ion implantation THOMAS ZAC WARD, Oak Ridge National Laboratory, HANGWEN GUO, University of Tennesssee, CHRISTIANNE BEEKMAN, WOLTER SIEMONS, HANS CHRISTEN, Oak Ridge National Laboratory, PHILIP RACK, University of Tennesssee, JOHN BUDAI, ZHENG GAI, Oak Ridge National Laboratory — Strongly correlated materials, such as cuprates, manganites, and heavy-fermions, have a wealth of exotic properties and are often associated with the coexistence of competing nearly degenerate states which couple simultaneously active degrees of freedom—charge, lattice, orbital, and spin states. To understand correlated electronic materials, we must begin to disentangle the underlying correlations and find novel methods to tune individual order parameters to recognize how mesoscopic interactions drive emergent behaviors. In this work, we will discuss recent progress on controlling the strain along the out-of-plane direction in epitaxial [LaSr]MnO3 films through implantation of noble ions. This technique allows for very fine manipulation of the lattice parameter in a manner that effectively gives us a novel means of controlling orbital overlaps without hole/carrier doping the sample. We observe that films can remain epitaxially lattice locked to the substrate while accommodating more than 1% lattice expansion out-of-plane. We will present phase diagrams based on this new type of "strain doping" and discuss the implications. Supported by the US DOE Office of Basic Energy Sciences, Materials Sciences and Engineering Division.

Thomas Zac Ward
Oak Ridge National Laboratory

Date submitted: 29 Oct 2012 Electronic form version 1.4