Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Reconstruction of $SrRuO_3$ Films During Pulsed Laser Deposition[1] ARTHUR BADDORF, JUNSOO SHIN, ALBINA BORISEVICH, VINCENT MEUNIER, SERGEI KALININ, Oak Ridge National Laboratory, E. WARD PLUMMER, Louisiana State University — $SrRuO_3$ (SRO) is a perovskite oxide conductor, widely used as an electrode in thin film systems due to its chemical and lattice compatibility. SRO thin films were grown on $SrTiO_3$ substrates by pulsed laser deposition and monitored with high-pressure reflection high-energy electron diffraction. High quality growth and flat films were confirmed with ex situ atomic force and scanning transmission electron microscopies. Oxygen growth pressures below ∼10 mtorr produced films that exhibited surface oxygen vacancies seen with scanning tunneling microscopy (STM). Typically, high oxygen pressures are employed to minimize oxygen vacancies, however for growth or post-annealing above ∼100 mtorr, in situ characterization by STM and low energy electron diffraction (LEED) revealed a surface reconstruction consisting of parallel rows with periodicity doubled in one direction. Density function theory (DFT) has found that additional oxygen can increase stability of a structure in which SrO rows buckle outward with excess oxygen bonding below. Reconstruction will affect film structures, interface properties, and screening.

[1]Research at ORNL's CNMS was sponsored by the Scientific User Facilities Division, Office of Basic Energy Sciences, U.S. DOE.

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Date submitted: 29 Nov 2009 Electronic form version 1.4