Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Characterization of interfacial charge accumulation in ferroelectric $BaTiO_3$/manganite interfaces using atomic-resolution annular bright field imaging and electron energy-loss spectroscopy[1] ROBERT KLIE, QIAO QIAO, PATRICK PHILLIPS, University of Illinois - Chicago, HANGHUI CHEN, Columbia University, MATTHEW MARSHALL, FRED WALKER, SOHRAB ISMAIL-BEIGI, CHARLES AHN, Yale University — Interfaces in functional oxides have been the focus of many studies due to potential emergence of novel phases. In this study, we will focus on ferroelectric/manganite, more specifically the $LaSrMnO_3/BaTiO_3$ interfaces in single-crystal thin films grown on $SrTiO_3$. Using atomic-resolution annular bright field (ABF) imaging, as well as atomic-column resolved electron energy-loss spectroscopy in the aberration-corrected, cold-field emission gun JEOL ARM200CF, we will demonstrate that the interfacial accumulation/depletion of charges, depending on the orientation of the ferroelectric polarization, can be directly quantified. We find that the interfacial accumulation of electron/holes is screen within three unit-cells of $LaSrMnO_3$. Moreover, using ABF imaging, we will shows that the distortions of the oxygen sublattice can be directly quantify, in both the $BaTiO_3$ layer, as well as the interfacial $LaSrMnO_3$. Our experimental results imaging and spectroscopy results will be complemented by first-principles density functional theory calculations.

[1]This work is supported in part by the National Science Foundation (DMR-0846748). The acquisition of the JEOL ARM200CF at UIC was made possible by a NSF MRI-R^2 grant (DMR-0959470 ARRA).

Robert Klie
University of Illinois - Chicago

Date submitted: 16 Nov 2012 Electronic form version 1.4