Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Chemically-induced Jahn-Teller ordering on manganite surfaces
ZHENG GAI, WENZHI LIN, Oak Ridge National Laboratory, J.D. BURTON, EVGENY Y. TSYMBAL, University of Nebraska Lincoln, K. FUCHIGAMI, IHI Corporation, JIAN SHEN, Fudan University, P.C. SNIJDERS, T.Z. WARD, STEPHEN JESSE, SERGEI V. KALININ, A.P. BADDORF, Oak Ridge National Laboratory — Physical and electrochemical phenomena at the surfaces of transition metal oxides and their coupling to local functionality remains one of the enigmas of condensed matter physics. Understanding the emergent physical phenomena at surfaces requires the capability to probe the local composition, map order parameter fields, and establish their coupling to electronic properties. Here we demonstrate that measuring the sub 30 pm displacements of atoms from high-symmetry positions in the atomically resolved scanning tunneling microscopy (STM) allows the physical order parameter fields to be visualized in real space on the single atom level. Here, this local crystallographic analysis is applied to the in-situ grown manganite surfaces. In particular, using direct bond-angle mapping we report direct observation of structural domains on manganite surfaces, and trace their origin to surface-chemistry-induced stabilization of ordered Jahn-Teller displacements. Density functional calculations provide insight into the intriguing interplay between the various degrees of freedom now resolved on the atomic level. Research was supported by MSED and CNMS, which are sponsored at Oak Ridge National Laboratory by the Office of Basic Energy Sciences, U.S. Department of Energy.

Guixin Cao
Oak Ridge National Laboratory

Date submitted: 15 Nov 2013 Electronic form version 1.4