Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electrical manipulation of interface conduction in BiFeO3-CoFe2O4 columnar heterostructures YI-CHUN CHEN, Department of Physics, National Cheng Kung University, YING-HUI HSIEH, Department of Materials Science and Engineering, National Chiao Tung University, JIA-MING LIOU, Department of Physics, National Cheng Kung University, CHIA-YING SHEN, YING-HAO CHU, Department of Materials Science and Engineering, National Chiao Tung University — Complex oxide interfaces emerge as one of the most exciting subjects in the condensed-matter field due to its unique physical properties and new possibilities for next-generation electronic devices. Recently, we found local conduction at the tubular interfaces of self-assembled BiFeO3 (BFO)-CoFe2O4 (CFO) heterostructures. In this study, to further investigate the electrical properties of the tubular oxide interface, conductive atomic force microscopy (CAFM) at different temperatures was performed to examine the sample. The origin of local conduction at the BFO-CFO vertical interface is identified as a result of the accumulation of oxygen vacancies. In addition, the interface conduction can be modulated with non-volatile and reversible behaviors via an external electric field. This memritor-like phenomenon can be understood owing to the movement of oxygen vacancies driven by the applied bias. The bias causes the oxygen vacancies either accumulate or deplete to the metal contact tip, which in turn affect the resistance at the tubular interface. Our results provide the control of the conduction at complex oxide interfaces and suggest the possibility for new devices based on complex oxide interfaces.

Yi-Chun Chen
Department of Physics, National Cheng Kung University

Date submitted: 07 Nov 2012 Electronic form version 1.4