Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Scanning tunneling microscopy investigation of local electronic properties at domain walls in multiferroic $BiFeO_3$ YA-PING CHIU, YU-TING CHEN, BO-CHAO HUANG, Department of Physics, National Sun Yat-sen University, JAN-CHI YANG, CHEN-WEI LIANG, YING-HAO CHU, Department of Materials Science and Engineering, National Chiao Tung University — Magnetoelectric coupling in multiferroic materials has attracted much attention because of the intriguing science underpinning this phenomenon and the exciting potential for applications and devices that take advantage of these materials with multiple order parameters. $BiFeO_3$ (BFO) is the room temperature, single-phase magnetoelectric multiferroic. Recently, the room-temperature electronic conductivity at ferroelectric domain walls in the oxide BFO multiferroics has been successfully demonstrated.[1] The fundamental mechanism responsible for the striking result mainly occurred with structurally driven changes in locally electronic structures. As motivated by the significance of this discovery, in the work, by using cross-sectional scanning tunneling microscopy, precise structural and electronic information on these epitaxial films are investigated. A combination of scanning tunneling spectroscopy and analysis of the ferroelectric domain walls on electronic structures suggests that domain walls in the oxide BFO multiferroics reveals a significant decrease in the band gap.

[1]J. Seidel and et al., *Nature Mater.* **8**, 229 (2009).

Ya-Ping Chiu
Department of Physics, National Sun Yat-sen University

Date submitted: 30 Nov 2009 Electronic form version 1.4