Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Ferroelectric control of two dimensional electron gas in oxide heterointerface[1] TRA VU THANH, Institute of Physics, National Chiao-Tung University, Hsinchu, Taiwan, JHIH-WEI CHEN, Department of Physics, National Cheng-Kung University, Tainan, Taiwan, CHAO-HUI YEH, Department of Electrical Engineering, National Tsing Hua University, Hsinchu, Taiwan, YI-CHUN CHEN, CHUNG-LIN WU, Department of Physics, National Cheng-Kung University, Tainan, Taiwan, JIUNN YUAN LIN, Institute of Physics, National Chiao-Tung University, Hsinchu, Taiwan, YING-HAO CHU, Department of Material Science and Engineering, National Chiao-Tung University, Hsinchu, Taiwan — Oxide heterointerfaces are emerging as one of the most exciting materials systems in condensed-matter science. One remarkable example is the $LaAlO_3$ /$SrTiO_3$ (LAO/STO) interface, a model system in which a highly mobile electron gas forms between two band insulators. Our study to manipulate the conductivity at this interface by using ferroeletricity of $Pb(Zr,Ti)O_3$. Our transport data strongly suggests that down polarization direction depletes the conducting interface of LAO/STO. After switching the polarization direction (up), it becomes accumulation. In addition, our experiments show there is obvious the band structure changed by cross-sectional scanning tunneling microscopy and combining with X-ray photoelectron spectroscopy (XPS) measurements. The transport properties are measured to build up the connection between macroscopic properties and local electronic structures that have been applied to study this structure. Controlling the conductivity of this oxide interface suggests that this technique may not only extend more generally to other oxide systems but also open much potential to ferroelectric field effect transistors.

[1]This work was supported by National Science Council of Taiwan, ROC

Tra Vu Thanh
Institute of Physics, National Chiao-Tung University, Hsinchu, Taiwan

Date submitted: 02 Dec 2011 Electronic form version 1.4