Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Unexpected Two Dimensional Electron Gas at the $LaAlO_3/SrTiO_3$ (110) Interface[1] A. ANNADI, X. WANG, K. GOPINADHAN, W.M. LV, Z.Q. LIU, A. ROY BARMAN, A. SRIVASTAVA, S. SAHA, S. DHAR, NUSNNI-Nanocore, National University of Singapore, Singapore, H. HILGENKAMP, University of Twente, The Netherlands, T. VENKATESAN, - ARIANDO, NUSNNI-Nanocore, National University of Singapore, Singapore — The observation of two dimensional electron gas (2DEG), superconductivity and magnetism at the interfaces of $LaAlO_3/SrTiO_3$ has further amplified the potential of complex oxides for novel electronics. These multifunctional properties are strongly believed to originate from the polarization discontinuity at the interface between the two oxides along (001) direction. In this scenario, the crystal orientation plays an important role and no conductivity would be expected for e.g., the interface between $LaAlO_3$ and (110)-oriented $SrTiO_3$, which should not have a polarization discontinuity. In this talk, we will show the observation of conductivity at the $LaAlO_3/SrTiO_3$ interface prepared on (110)-oriented $SrTiO_3$. The strong evidence for 2DEG at the interface of $LaAlO_3/SrTiO_3$ (110) is the observed thickness dependence of insulator-metal transition at 3-4 u.c of $LaAlO_3$. Directional dependent electrical transport is observed in resistance versus temperature measurements. We propose some models for explaining the observed phenomena.

[1]We thank National Research Foundation (NRF) Singapore under the Competitive Research Program (CRP) "Tailoring Oxide Electronics by Atomic Control" NRF2008NRF-CRP002-024 and Ministry of Education (MOE) FRC-ARF Grant No. R-144-000-278-112.

Ariando *
NUSNNI-Nanocore, National University of Singapore, Singapore

Date submitted: 19 Dec 2011 Electronic form version 1.4