Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electrical transport properties of $BaTiO_3/LaAlO_3/SrTiO_3$ heterostructure THACH NGO, LKHAGVASUREEN BAASANDORJ, University of Science and Technology, Korea Research Institute of Standards and Science, JONGHYUN SONG, Chungnam National University, JINHEE KIM, Korea Research Institute of Standards and Science — Strongly correlated materials with incompletely filled d- of f-electron shells exhibit unusual electronic and magnetic properties, which cannot be effectively explained in terms of non-interacting electron model, and hence hold the promise of novel electronic applications. Here we report the tunneling measurement across $BaTiO_3/LaAlO_3/SrTiO_3$ heterostructure revealing the metal-insulator transition (MIT), at low temperatures, modulated by varying $BaTiO_3$ (BTO) layer thickness. Accordingly, we observed an Ohmic behavior at temperatures > 200 K for all BTO thicknesses, this can be understood with thermoionic emission mechanism, and a clear rectification at low temperatures. The direct tunneling lends a good explanation for the structures with thin BTO layer (< 8 unit cells) and the critical thickness for Zener tunneling contribution is 20 unit cells of BTO. The MIT was clearly observed in the structure with 18 unit cells of BTO.

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Date submitted: 26 Nov 2012 Electronic form version 1.4