Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

All-Epitaxial Ferroelectric Tunnel Junctions with Ultrathin BaTiO3 DANIEL SANDO, SEUNGRAN LEE, YEONG JAE SHIN, Center for Correlated Electron Systems, IBS, Seoul National University, MYEONG RAE CHO, YUN PARK, Department of Physics and Astronomy, Seoul National University, TAE WON NOH, Center for Correlated Electron Systems, IBS, Seoul National University
— Ferroelectric tunnel junctions (FTJs) are a promising route toward the development of high density, non volatile memories with non-destructive readout [1]. The principle of operation is polarization-dependent tunneling electroresistance (TER). The direction of polarization in the ferroelectric layer defines high and low resistance states. So far, the most impressive results regarding TER ON/OFF ratios have been either without a top electrode, or using a top electrode of a non-oxide metal. However, defects in the ferroelectric [2] or interfacial layer can reduce performance. To overcome these limitations, we have fabricated fully-strained epitaxial FTJs using perovskite oxides for all layers: $La_{0.67}Sr_{0.33}MnO_3/BaTiO_3/SrRuO_3//SrTiO_3$. The heterostructures are grown by pulsed laser deposition and show high structural quality, sharp interfaces, and very smooth surfaces. Top electrodes are patterned using e-beam lithography. Piezoresponse force microscopy shows that ferroelectricity is maintained for a barrier thickness as low as 3 unit cells. We present our results on TER performance and the dependence of switching properties on the $BaTiO_3$ thickness. [1] V. Garcia, et al. Nature 460, 81-84 (2009). [2] M. Dawber, K. M. Rabe, J.F. Scott, Rev. Mod. Phys. 77, 1083 (2005).

Daniel Sando
Center for Correlated Electron Systems, IBS, Seoul National University

Date submitted: 14 Nov 2014 Electronic form version 1.4