Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Tunneling Electroresistance in Ferroelectric Tunnel Junctions with a Composite Barrier M. Y. ZHURAVLEV, Y. WANG, E. Y. TSYMBAL, Department of Physics and Astronomy, University of Nebraska-Lincoln, S. MAEKAWA, Institute for Materials Research, Tohoku University — A ferroelectric tunnel junction (FTJ) is a tunnel junction in which a thin ferroelectric layer serves as a barrier between two metal electrodes.[1] Contrary to ferroelectric capacitors where leakage currents are detrimental to the device performance, the conductance of a FTJ is the functional characteristic of the device. The key property of FTJ is tunneling electroresistance (TER) that is a change in electrical resistance with reversal of ferroelectric polarization. It was predicted that TER in FTJs can be sizable due to the change in the tunneling potential barrier dependent on polarization orientation. [2] In this work we predict that a FTJ with a composite barrier that combines a functional ferroelectric film and a thin non-polar dielectric layer can exhibit a significantly enhanced TER. [3] Due to the change in the electrostatic potential with polarization reversal the non-polar dielectric barrier acts as a switch that changes its barrier height from a low to high value. The predicted values of TER are giant reaching several orders of magnitude. The proposed method of enhancing TER may be practical for device applications. [1] E. Y. Tsymbal and H. Kohlstedt, *Science* **313**, 181 (2006); [2] M. Y. Zhuravlev et al, *Phys. Rev. Lett.* **94**, 246802 (2005); [3] M. Y. Zhuravlev et al, *Appl. Phys. Lett.* **95**, 052902 (2009).

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Date submitted: 19 Nov 2009 Electronic form version 1.4