

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Electric-field-switchable modulation doping in a ferroelectric-semiconductor heterostructure** XIAOHUI LIU, Rutgers University, EVGENY TSYMBAL, University of Nebraska-Lincoln, KARIN RABE, Rutgers University — In most ferroelectric field-effect transistor (FFET) configurations, the modulation of the conductivity by switching of the ferroelectric gate is dominated by the electrostatically-induced change in carrier concentration in the channel. However, recent work on PZT/LaNiO<sub>3</sub> has shown that the conductivity of the on state can be dramatically increased by opening of conducting channels in the ferroelectric itself [REF]. In this work, we present first-principles calculations for ferroelectric BaTiO<sub>3</sub> on n-type SrTiO<sub>3</sub>, showing an even larger effect of this type. We present a simple model that shows that conduction in the ferroelectric is largely controlled by the work function step between the ferroelectric and the channel material. Extensions of these investigations to other FFET material combinations will be discussed.

[REF] M. S. J. Marshall, A. Malashevich, A. S. Disa, M.-G. Han, H. Chen, Y. Zhu, S. Ismail-Beigi, F. J. Walker and C. H. Ahn, Phys. Rev. Applied 2, 051001 (2014).

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Date submitted: 11 Nov 2016

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