Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Organic multiferroic tunnel junctions with ferroelectric poly(vinylidene difluoride) barriers J. M. LOPEZ, University of Puerto Rico, Y. SUN, J. D. BURTON, E. Y. TSYMBAL, University of Nebraska - Lincoln, J. P. VELEV, University of Puerto Rico — Organic polymers, such as poly(vinylidene difluoride) (PVDF), form high quality ordered layers and exhibit robust ferroelectricity down to a monolayer [1]. This property makes PVDF polymers promising as barriers in multiferroic tunnel junctions (MFTJs) – devices which exhibit multiple resistance states associated with different magnetization and ferroelectric polarization configurations [2]. In this work we present first-principles calculations of the spin-polarized tunneling conductance of crystalline Co/PVDF/Co(0001) MFTJs. Using the Landauer-Büttiker formalism implemented within a plane-wave pseudopotential method we calculate spin-resolved transmission for parallel and antiparallel magnetization of the electrodes. Our calculations predict a negative spin polarization of the tunneling conductance and a sizable tunneling magnetoresistance (TMR) in these junctions. Further efforts are aimed at exploring the tunneling electroresistance (TER) effects in asymmetric MFTJs where a monolayer of Au is deposited at one of the interfaces. Our results indicate that organic ferroelectric materials may open a new promising direction in organic spintronics. [1] A. V. Bune et al, *Nature* **391**, 874 (1998). [2] J. P. Velev et al, *Nano Lett.* **9**, 427 (2009).

Julian P. Velev
University of Puerto Rico

Date submitted: 18 Nov 2009 Electronic form version 1.4