Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Voltage control of spin polarization in $La_{0.7}Sr_{0.3}MnO_3/C_5H_2O_5/SiO_2/Co$ spin valves with organic ferroelectric barrier[1] YUEWEI YIN, XUANYUAN JIANG, XIAOSHAN XU, Department of Physics and Astronomy, Nebraska Center for Materials and Nanoscience, University of Nebraska, Lincoln, Nebraska 68588, USA — Voltage control of spin degree of freedom is a great challenge in modern spintronics research. Here, an organic spin valve, employing a thin organic croconic acid ($C_5H_2O_5$) as a ferroelectric barrier sandwiched between two ferromagnetic electrodes ($La_{0.7}Sr_{0.3}MnO_3$ and Co), has been successfully fabricated, in which a control of the spin polarization by purely electrical method was realized. Both the tunneling magnetoresistance (TMR) effect reflecting the magnitude of spin polarization and the tunneling electroresistance (TER) effect possibly related to the ferroelectric polarization reversal were observed. More importantly, not only the magnitude but also the sign of the TMR appears to be correlated to the ferroelectric polarization reversal. With ferroelectric polarization pointing to the Co, the resistance is low and the sign of the TMR is negative; while after switching the ferroelectric polarization towards the $La_{0.7}Sr_{0.3}MnO_3$, the resistance is significantly increased and the sign of the *TMR* is negative at positive biases and positive at negative biases. Possible mechanisms based on ferroelectricity controlled band alignment and interfacial redox of Co will be discussed.

[1]This work was supported by the NSF through UNL MRSEC (DMR-1420645)

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Date submitted: 08 Nov 2016 Electronic form version 1.4