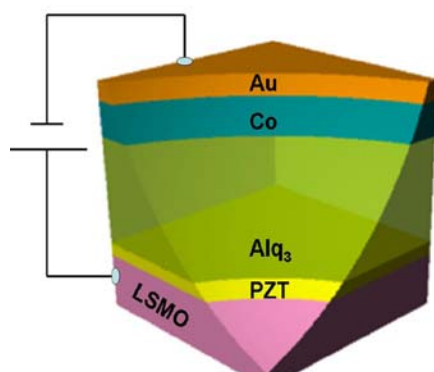


Prof. Xiaoshan Xu

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Multiferroic Organic Spintronics



Organic spintronic devices have been appealing because of the long spin life time of the charge carriers in the organic materials and their low cost, flexibility and chemical diversity. In previous studies, the control of resistance of organic spin valves is generally achieved by the alignment of the magnetization directions of the two ferromagnetic electrodes, generating magnetoresistance. Here we employ a new knob to tune the resistance of organic spin valves by adding a thin ferroelectric interfacial layer between the ferromagnetic electrode and the organic spacer. We show that the resistance can be controlled by not only the spin alignment of the two ferromagnetic electrodes, but also by the electric polarization of the interfacial ferroelectric

layer: the MR of the spin valve depends strongly on the history of the bias voltage which is correlated with the polarization of the ferroelectric layer; the MR even changes sign when the electric polarization of the ferroelectric layer is reversed. This new tunability can be understood in terms of the change of relative energy level alignment between ferromagnetic electrode and the organic spacer caused by the electric dipole moment of the ferroelectric layer. These findings enable active control of resistance using both electric and magnetic fields, opening up possibility for multi-state organic spin valves and shed light on the mechanism of the spin transport in organic spin valves.

Dr. Xiaoshan Xu has obtained his Ph.D. degree from Georgia Institute of Technology in Physics with minors in Computer Science and his B.A. and M.S. degrees from Nanjing University in Physics. He has worked as a postdoctoral research associate in the University of Tennessee, a staff member in the Oak Ridge National Lab (ORNL), and a research associate in Bryn Mawr College. He joined the department of Physics and Astronomy in the University of Nebraska-Lincoln as an assistant professor in 2013. Dr. Xu won Chinese Government Award for Outstanding Self-Financed Students Abroad. He is also a recipient of the Eugene Wigner Fellowship, the most prestigious early career award within ORNL.

Wednesday, April 9, 4:00 pm
Room 136 Jorgensen Hall

3:45pm—Refreshments served in Jorgensen Atrium area

Host:
Prof. David Sellmyer
 Department of
 Physics & Astronomy

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