MAR16-2015-005115

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Interconnections between magnetic state and transport currents in antiferromagnetic Sr_2IrO_4

MAXIM TSOI, The University of Texas at Austin

Interconnections between magnetic state and transport currents in ferromagnetic (F) heterostructures are the basis for spintronic applications, e.g. tunneling magnetoresistance and spin-transfer torque phenomena provide a means to read and write information in magnetic memory devices like STTRAM. Similar interconnections were proposed [1] to occur in systems where F-components are replaced with antiferromagnets (AFM). We demonstrated experimentally the existence of such interconnections in antiferromagnetic Mott insulator Sr_2IrO_4: first, we found [2] a very large anisotropic magnetoresistance (AMR) which can be used to monitor (read) the magnetic state of AFM; second, we demonstrated [3] the feasibility of reversible resistive switching driven by high-density currents/high electric fields which can be used for writing in AFM memory applications. These results support the feasibility of AFM spintronics where antiferromagnets are used in place of ferromagnets. This work was supported in part by C-SPIN, one of six centers of STARnet, a Semiconductor Research Corporation program, sponsored by MARCO and DARPA, and by NSF grants DMR-1207577, DMR-1265162 and DMR-1122603. [1] A. S. Núñez et al., Phys. Rev. B 73, 214426 (2006); [2] C. Wang et al., Phys. Rev. X 4, 041034 (2014); [3] C. Wang et al, PRB 92, 115136 (2015).