Spin-Polarized Current Induced by a Magnetic Insulator

BOCHAO LI, GEJIAN ZHAO, DONGRIN KIM, MIGUEL BUENO, JI ZHANG, JESSICA GIFFORD, TINGYONG CHEN, Arizona State University — Spintronics takes advantage of both charge and spin of conduction electrons but a spin source is often required to generate a spin polarized current for a spintronic device. Conventionally a magnetic metal is utilized as a spin source but in many cases spin cannot be efficiently injected from a magnetic metal into another material because of complexities such as lattice and conductivity mismatch. In this work, we experimentally demonstrate that a spin-polarized current can be generated in a nonmagnetic metal using a magnetic insulator through the proximity effect. A Pt layer of a few nanometers grown on a magnetic insulator Yttrium iron garnet, Y3Fe2(FeO4)3, (YIG) shows anisotropic magnetoresistance and substantial spin polarization.