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Manipulation of Magnetic Insulators Using Spin Torque from the Spin Hall Effect COLIN JERMAIN, Cornell University, AARON ROSENBERG, Stanford University, HANJONG PAIK, SRIHARSHA ARADHYA, Cornell University, HAILONG WANG, Ohio State University, JOHN HERON, Cornell University, KATJA NOWACK, JOHN KIRTLEY, Stanford University, DARRELL SCHLOM, Cornell University, KATHRYN MOLER, Stanford University, FENGYUAN YANG, Ohio State University, DAN RALPH, Cornell University — We are exploring the possibility of current-induced switching driven by spin torque from the spin Hall effect for micron and nanoscale devices made from the magnetic insulators yttrium iron garnet (YIG) and lutetium iron garnet (LuIG). We will report on the fabrication of devices incorporating thin films of YIG or LuIG with thickness less than 20 nm and in-plane magnetization. We use electron beam lithography and ion milling to pattern the films into device structures with sizes ranging from 50 nm to 4 microns, integrated with a Ta or Pt layer so that we can use the spin Hall effect to apply spin-transfer torque to the magnetic materials. With scanning SQUID magnetometry we measure the in-plane dipole orientation of the device magnetic moment at 4 K. By examining the magnetic orientation as a function of applied current we investigate whether the spin Hall torque can be used to drive reliable magnetic switching at low current levels.

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