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Manipulation of Magnetic Insulators Using Spin Torque from the Spin Hall Effect COLIN JERMAIN, HANJONG PAIK, JOHN HERON, SRIHARSHA ARADHYA, DARRELL SCHLOM, DAN RALPH, Cornell University — We will report the growth and fabrication of devices incorporating thin films of the magnetic insulators yttrium iron garnet and lutetium iron garnet with thicknesses less than 20 nm. We perform the growth using oxide MBE, achieving high-quality films with magnetic damping parameters for single 5 nm films as small as 0.00036. We use electron beam lithography and ion milling to pattern the films into device structures with sizes ranging from 100 nm to above 1 micron, integrated with Ta contacts so that we can use the spin Hall effect to apply spin-transfer torque to the magnetic materials. We will use these devices to study how the spin Hall torque affects the effective magnetic damping parameter of isolated magnetic insulator devices, and whether spin Hall torque can be used to drive reliable magnetic switching in these materials at low current levels.

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