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The spin Hall effect in single-crystal platinum GREGORY M. STIEHL, JOHN T. HERON, NEAL REYNOLDS, ALEX MELLNIK, Department of Physics, Cornell University, ROBERT A. BUHRMAN, School of Applied and Engineering Physics, Cornell University, DARRELL G. SCHLOM, Department of Materials Science and Engineering, Cornell University,, DANIEL C. RALPH, Department of Physics, Cornell University — We have developed a process to grow thin films of single-crystal platinum by DC magnetron sputtering at elevated temperatures with post growth annealing. We have incorporated these films into bilayers with polycrystalline permalloy ($Ni_{80}Fe_{20}$) for measurements of the spin transfer torque generated by the spin Hall effect in the platinum. We will compare measurements of the strength of the spin Hall effect, the spin diffusion length, and the Pt/permalloy spin mixing conductance between these samples and samples containing a polycrystalline Pt layer. With these studies we hope to understand better how disorder may affect the generation of spin currents by the spin Hall effect and the transmission of spin currents from a spin Hall metal to a ferromagnet.

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