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Enhanced Magnetic Damping in Spin-Transfer Excitation ERIC RYAN, I. N. KRIVOROTOV, N. C. EMLEY, E. TAN, P. M. BRAGANCA, S. I. KISELEV, J.C. SANKEY, D. C. RALPH, R. A. BUHRMAN, Cornell University, J. A. KATINE, Hitachi Global Storage Technologies — While magnetic damping is understood to play a fundamental role in spin-torque phenomena, little experimental work has been done to study the effect of varying the damping parameter α. Recently, light terbium (Tb) doping in thin films of permalloy (Py) has been shown to increase α by several orders of magnitude [1]. To directly study the effect of increased α on spin-transfer systems, we have fabricated 0.05 um^2 Py/Cu/Py nanopillar spin valves with Tb-doping between 0 and 2% in the free layer. We find that, while the GMR varies less than 20%, the critical currents for reversibly switching the free layer (proportional to α) are two to three times larger in the 2% Tb samples than in pure Py samples. This substantial increase is still considerably less than the increase in α observed in the bulk film measurements of similar composition samples, suggesting that processes other than intrinsic spin-orbital coupling can dominate α in spin-transfer nanopillars. The Tb doping also increases the critical current for the onset of processional dynamics. These results suggest one approach to reducing the negative impact of spin torque effects on nanoscale spin valve and tunnel junction read head sensors. [1] S. E. Russek, et al., J. Appl. Phys. 91, 8659 (2002).

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