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Fast Pulse Measurements and Temperature Variation of Enhanced Magnetic Damping of Spin-Transfer Excitation E. M. RYAN, A. G. F. GARCIA, P. M. BRAGANCA, G. D. FUCHS, N. C. EMLEY, J. C. READ, E. TAN, D. C. RALPH, R. A. BUHRMAN, Cornell University, J. A. KATINE, Hitachi G.S.T. — Recently, light terbium (Tb) doping in thin films of permalloy (Py) has been shown to increase the damping parameter α by several orders of magnitude [1]. To directly study the effect of increased α on spin-transfer systems, we have fabricated 0.004 um^2 Py/Cu/Py nanopillar spin valves with 0 and 2% Tb in the free layer, and measured critical currents across a range of temperatures from 4.2 K to 295 K. We find that the critical currents for reversibly switching the free layer, generally expected to be proportional to α, are several times larger on average in the 2% Tb samples than in pure Py samples, and increase linearly with decreasing temperature. We will also discuss FMR data, and data for switching with fast pulses from 1 to 100 nsec at both 150 K and room temperature, along with matching simulations that allows us to extract α and other spin-torque parameters [2]. These results suggest one approach for controllably reducing the negative impact of spin-torque effects on nanoscale spin valve and read head sensors, and achieving a deeper understanding of these spin-torque devices. [1] W. Bailey, P. Kabos, F. Mancoff, and S. E. Russek, IEEE Trans. Magn. 37, 1749 (2001). [2] P. M. Braganca, et al. Appl. Phys. Lett. 87, 112507 (2005).

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