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Noise Reduction and Other Effects of Rare-Earth Doping in Magnetic Spin-Transfer Systems ERIC RYAN, Cornell University, O. OZATAY, P. M. BRAGANCA, N. C. EMLEY, D. C. RALPH, R. A. BUHRMAN, Cornell University, J. A. KATINE, Hitachi Global Storage Technologies — At sufficiently large current densities, spin-torque can excite high frequency dynamics in magnetic trilayers. While this effect can lead to interesting new applications and phenomena, it also introduces detrimental effects, such as creating high frequency noise in next generation GMR read heads. 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], which should suppress spin-torque effects. 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. We will present data from these devices showing that critical switching current, coercive field, and high frequency noise suppression are all increased in the presences of terbium, and that these effects have a strong and extended temperature dependence. Proper choice of materials can lead to even larger effects at room temperature and beyond, an important regime for technological applications. We will explore the mechanism of the enhanced damping effects as a function of temperature in terbium-doped CoFe and NiFe films and devices. [1] W. Bailey, P. Kabos, F. Mancoff, and S. E. Russek, IEEE Trans. Magn. 37, 1749 (2001).

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