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Tunable spin-torque in magnetic tunnel junctions with two fixed layers G.D. FUCHS, I.N. KRIVOROTOV, P.M. BRAGANCA, O. OZATAY, N.C. EMLEY, A.G.F. GARCIA, D.C. RALPH, R.A. BUHRMAN, Cornell University — We have fabricated nanoscale magnetic tunnel junctions (MTJs) with an additional copper spacer layer and fixed magnetic layer above the free layer of the standard MTJ structure. When this device is biased, the additional magnetic layer acts as a second source of spin-polarized electrons that exert torque on the free layer. Depending on the relative orientation of the two fixed layers, this torque can either oppose or augment the torque exerted by tunnel current. We have measured the T-dependant switching behavior of these devices which we can describe by a model that incorporates spin-torque effects and substantial ohmic heating at spin-torque switching current levels. We find that the spin-torque exerted by our MTJs is very comparable to that exerted by the spin valve. By adjusting the relative orientation of the fixed layers, we can either effectively double or nearly cancel out the net spin-torque on the free layer. This has significance for applications like spin-transfer switched MRAM, where spin-torque is exploited, and for magnetic sensing applications, where spin-torque is parasitic.

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