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Spin Torque Switching in Asymmetric $Fe_{60}Co_{20}B_{20}$/MgO/ $Ni_{60}Fe_{20}B_{20}$ Magnetic Tunnel Junctions HINWEI TSENG, Y. LI, Cornell Univ., J.C. READ, NIST, Gaithersburg MD, C. WANG, O.L. LEE, P.G. GOWTHAM, Cornell Univ., P.M. BRAGANCA, HGST, San Jose, CA, D.C. RALPH, R.A. BUHRMAN, Cornell Univ., CORNELL UNIV. TEAM — Spin-torque (ST) studies involving MgO-based magnetic tunnel junctions (MTJs) generally have utilized junctions with fixed and free electrodes of similar or identical CoFe-based composition. Here we report the bias-dependent conductance, TMR, and ST behavior of nanopillar MTJs with asymmetric $Fe_{60}Co_{20}B_{20}$/MgO/ $Ni_{60}Fe_{20}B_{20}$ electrodes (AMTJ) having good performance (TMR$\sim$100%, RA=10$\Omega\mu$m^2).We compare to symmetric (SMTJ) $Fe_{60}Co_{20}B_{20}$/MgO/$Fe_{60}Co_{20}B_{20}$ junctions (TMR $\sim$ **120%**, RA = **10**$\Omega\mu$m^2). The magnitude of the bias dependence of TMR for the AMTJ is markedly less than for the SMTJ. In the AMTJs, using bias and field dependent measurements of thermally-activated ST-assisted reversal, we have observed a very significant asymmetry in the polarity-dependent ST critical currents and thermal activation barriers for reversal. Accordingly, the ST phase diagram, measured under high bias, shows a strong asymmetry with bias polarity, which we attribute to a polarity-dependent asymmetry in the field-like ST term at high bias. We will discuss the possible causes of these results based on the different band structures and work functions of FeCo and NiFe.

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