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Magnon contribution to the spin torque and magnetoresistance properties of FeCoB/MgO/FeCoB magnetic tunnel junctions YUN LI, HSIN-WEI TSENG, Cornell University, Ithaca, NY 14853, JOHN READ, JORDAN KATINE, HGST,San Jose, California, 95135 , DANIEL RALPH, ROBERT BUHRMAN, Cornell University, Ithaca, NY 14853 — We have studied the spin-torque excited ferromagnetic resonance (ST-FMR) and the tunneling magnetoresistance (TMR) properties of FeCoB/MgO/FeCoB magnetic tunnel junctions as a function of temperature from 300K to 10K. We find that while the TMR increases by $\sim 50\%$ upon cooling to 10 K, the in-plane spin torque and the perpendicular or field-like torque both decrease substantially. The results demonstrate that while magnon-assisted tunneling degrades TMR, it acts to significantly enhance ST in MTJs, in accord with theoretical prediction. Moreover, the bias-dependent structure in both the asymmetry of the in-plane ST and the parallel conductance of the MTJ is more pronounced at low temperature, indicative of this asymmetry being due substantially to the interfacial electronic structure of the electrodes.

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