Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Voltage control of ferromagnetic resonance in magnetic tunnel junctions: perpendicular vs in-plane magnetization M. WILLIAMSON, H. SEINIGE, The University of Texas at Austin, H. ALMASI, University of Arizona, X. CHAO, University of Minnesota, W. WANG, University of Arizona, J.-P. WANG, University of Minnesota, M. TSOI, The University of Texas at Austin — Voltage controlled magnetic anisotropy (VCMA) attracts considerable attention as a novel method to control and manipulate magnetizations in fast-switching and low-power spintronic devices based on magnetic tunnel junctions (MTJs). In our experiments, we probe VCMA by ferromagnetic resonance (FMR) driven by microwave currents applied to CoFeB/MgO/CoFeB MTJs subject to high dc biases. We compare the effect of voltage bias on FMR in MTJs with perpendicular and in-plane magnetizations. As expected, we observe a linear shift of the resonance field with the applied bias in perpendicularly magnetized samples. In contrast, the in-plane samples exhibit a quadratic shift of the resonance field as a function of the dc bias. Both shifts can be explained by changes in the effective field due to the onset of out-of-plane VCMA. This work was supported in part by C-SPIN, one of six centers of STARnet, a Semiconductor Research Corporation program, sponsored by MARCO and DARPA.

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Date submitted: 20 Nov 2016 Electronic form version 1.4