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Spin-Hall Switching of In-plane Exchange Biased Heterostructures MAXWELL MANN, GEOFFREY BEACH, Massachusetts Inst of Tech-MIT — The spin Hall effect (SHE) in heavy-metal/ferromagnet bilayers generates a pure transverse spin current from in-plane charge current, allowing for efficient switching of spintronic devices with perpendicular magnetic anisotropy [1,2,3,4]. Here, we demonstrate that an AFM deposited adjacent to the FM establishes a large in-plane exchange bias field, allowing operation at zero HIP. We sputtered Pt(3nm)/Co(0.9nm)/Ni80Co20O(tAF) stacks at room-temperature in an in-plane magnetic field of 3 kOe. The current-induced effective field was estimated in Hall cross devices by measuring the variation of the out-of-plane switching field as a function of JIP and HIP. The spin torque efficiency, dHSL/dJIP, is measured versus HIP for a sample with tAF=30 nm, and for a control in which NiCoO is replaced by TaOx. In the latter, dHSL/dJIP varied linearly with HIP. In the former, dHSL/dJIP varied nonlinearly with HIP and exhibited an offset indicating nonzero spin torque efficiency with zero HIP. The magnitude of HEB was 600 Oe in-plane. [1] D'yakonov and Perel JETP Lett., 1971. [2] Hirsch, PRL 1999. [3] Kato et al. Science, 2004. [4] Liu et al. PRL 2012.

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