Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

A novel three-terminal spintronics device utilizing the spin Hall effect CHI-FENG PAI, LUQIAO LIU, HSIN-WEI TSENG, YUN LI, School of Applied and Engineering Physics, Cornell University, DANIEL C. RALPH, Department of Physics, Cornell University, ROBERT A. BUHRMAN, School of Applied and Engineering Physics, Cornell University — Previous work[1] has established that the spin Hall effect (SHE) in certain thin film metallic layers can generate a transverse spin current large enough to effect, through spin transfer torque (STT), the reversible magnetic switching of an adjacent ferromagnetic layer having perpendicular magnetic anisotropy. Here we discuss a new three-terminal spintronics device that utilizes the SHE induced STT to efficiently and reversibly switch the magnetic orientation of a thin free layer electrode of an MgO magnetic tunnel junction having in-plane magnetization. The low write currents ($\leq$ 1mA), large output impedance and good thermal stability ($45 k_B T$) that has been achieved with this SHE three-terminal device approach, which separates the write and read operations in a manner that is relatively straightforward to fabricate, demonstrate an attractive candidate for application in next generation STT MRAM and non-volatile spin logic circuits.

[1]Luqiao Liu *et al.,*arXiv:1110.6846 and Luqiao Liu invited presentation this conference (focus topic 10.1.4)

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Date submitted: 17 Nov 2011 Electronic form version 1.4