Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Current-driven domain wall dynamics in ultrathin heavy-metal/ferromagnet/oxide submicron strips[1] SATORU EMORI, SUNG-MIN AHN, GEOFFREY BEACH, Massachusetts Institute of Technology — Recent studies have reported efficient current-driven domain wall (DW) motion and magnetization switching in out-of-plane magnetized structures consisting of an ultrathin (<1 nm) ferromagnetic Co layer embedded between a heavy-metal Pt underlayer and an oxide overlayer such as AlOx [1, 2] and GdOx [3]. These phenomena have been attributed to "spin-orbit" torques arising from the metal-oxide interface (Rashba effect) and in the heavy-metal underlayer (spin Hall effect). We investigate current-driven DW motion in submicron-wide strips of ultrathin Ta/CoFe/MgO and Pt/CoFe/MgO. DWs move in the direction of electron flow in Ta/CoFe/MgO, whereas they move against electron flow in Pt/CoFe/MgO. Measurements of the DW propagation field and velocity reveal large spin torque efficiencies exceeding 100 Oe/10^{11} A/m^2 in both structures. Because the signs of the spin Hall angles of Ta and Pt are opposite, the spin Hall effect may partially explain such efficient current-driven DW motion whose directionality differs with the heavy-metal underlayer. [1] I.M. Miron et al, Nat. Mater. 10, 419 (2011). [2] L. Liu et al, arXiv:1110.6846 (2011). [3] S. Emori et al, Appl. Phys. Lett. 101, 042405 (2012)

[1]This work was supported under NSF-ECCS 1128439.

Satoru Emori
Massachusetts Institute of Technology

Date submitted: 09 Nov 2012 Electronic form version 1.4