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Rapid Domain Wall Motion in Permalloy Nanowires Excited by Spin-Polarized Current Applied Perpendicular to the Nanowire C. BOONE, X. CHENG, UC Irvine, J. KATINE, J. CHILDRESS, M. CAREY, Hitachi Global Storage, I. KRIVOROTOV, UC Irvine — We make measurements of domain wall (DW) dynamics in permalloy (Py) nanowires with spin-polarized current applied perpendicular to the nanowire. DW motion is excited in the free layer of a 90 nm wide Py(3 nm)/ Cu(5 nm)/ CoFe(7 nm) nanowire spin valve. The DW is trapped under the top lead of the spin valve, and oscillatory motion is excited by AC applied between the top and bottom leads. Using spin-torque ferromagnetic resonance to characterize the dynamics [1], we observe DW velocities as high as 800 m/s at current densities below 10^7 A/cm^2. This exceeds the maximum DW velocities ($\sim$100 m/s) observed at higher current densities ($>10^8$ A/cm^2) when current is applied along the nanowire [2]. This shows that spin torque from current applied perpendicular to a ferromagnetic nanowire excites DW dynamics more efficiently than current flowing along the nanowire.

[1] J.C. Sankey, et al., Phys. Rev. Lett. 96, 227601 (2006)
[2] M. Hayashi, et al., Phys. Rev. Lett. 98, 037204 (2007)

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