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High Speed Spin Torque Memory with Combined Perpendicular and In-Plane Polarizers GRAHAM ROWLANDS, TOFIZUR RAHMAN, JORDAN KATINE, JUAN ALZATE, ALEXEY KOVALEV, YAROSLAV TSERKOVNYAK, KOSMAS GALATSIS, PEDRAM KHALILI AMIRI, KANG WANG, JIAN-PING WANG, ILYA KRIVOROTOV — The use of a perpendicular polarizing layer in combination with an in-plane free layer has been proposed [1] as a means of reducing the switching time and write energy of spin-torque MRAM cells. While these structures have been realized in nanopillars with metallic spacers [2-4], memory applications demand the use of magnetic tunnel junctions (MTJs) due to their higher magnetoresistance and better impedance matching to a write transistor. We augment standard in-plane CoFeB/ MgO/ CoFeB MTJs to include an additional fixed layer pulled out-of-plane by coupling to the adjacent [Co/Pd] multilayer designed to possess a strong perpendicular magnetic anisotropy. This additional polarizer generates spin torque with an out-of-plane component, resulting in a fast precessional switching with no incubation time or pre-switching oscillations. For a variety of sample sizes we observe switching times approaching 100 ps. References: [1] A. D. Kent et al. Appl. Phys. Lett. 84, 3897 (2004). [2] C. Papusoi et al. Appl. Phys. Lett. 95, 072506 (2009) [3] O. J. Lee et al. 95, 012506 (2009) [4] R. Sbiaa et al. J. Appl. Phys. 105, 013910 (2009)

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