

Magnetic Domain wall motion in [CoSiB/Pt]_N thin films with perpendicular magnetic anisotropy

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Amorphous CoSiB/Pt multilayer is a perpendicular magnetic anisotropy (PMA) material to achieve high squareness, low coercivity, strong anisotropy, and smooth domain wall (DW) motion, because of the smoother interface compared with crystalline multilayers. For [CoSiB(6 Å)/Pt (14 Å)]_N multilayers with N = 3, 6, and 9, we studied the field-induced DW dynamics. The results suggest that the amorphous [CoSiB/Pt]_N multilayers are inherently homogeneous compared to crystalline multilayers. For N ≤ 6, the pinning site density ρ_{pin} is less than 1000/ μm^2 , which is about 1 pinning site per the typical device junction size of 30 × 30 nm². Also, the exchange stiffness constant A_{ex} is obtained to be 0.48×10^{-6} erg/cm, and the domain wall width is expected to be much smaller than other crystalline PMA systems. These results may be applicable for spin-transfer-torque magnetic random access memory (STT-MRAM) and DW logic device applications.