MAGNETIZATION DYNAMICS OF PERPENDICULAR EXCHANGE–BIASED (Pt/Co)–Pt–IrMn MULTILAYERS STUDIED BY MOKE MICROSCOPY AND MAGNETOMETRY

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9.7 cm

The magnetization dynamics of [2 nm Pt/5 nm Co]$_3$/t *nm* Pt/10 nm IrMn/2 nm Pt multilayers, in which a ferromagnetic multilayer with perpendicular magnetic anisotropy is separated from an IrMn antiferromagnet by a thin Pt insertion layer with 0.1 nm $\leq t \leq$ 1.2 nm, has been investigated by Kerr magnetometry and Kerr microscopy. The insertion of 0.1 nm thick Pt enhances the exchange bias field ($\mu_0 H_{eb}$) from 20 mT to 28 mT above which it decreases exponentially with increasing Pt layer thickness. We show from relaxation measurements of the magnetization $M(t)$as well as by direct observation of magnetic domains, that the magnetization reversal at maximum H_{eb} takes place by the nucleation of isolated cylindrical domains with different nucleation density sites for the forward and backward branches of the hysteresis loop. For a Pt layer thickness larger than 0.4 nm magnetization reversal proceeds by domain wall movement. All the results will be quantitatively analyzed using Fatuzzo[1] theory. The origin and magnitude of the activation energies for the domain nucleation and domain wall movement processes will be discussed.

[1] E. Fatuzzo, Phys.Rev. 127 (1962) 1999

13.4 cm

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