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Induced magnetic structure in exchange-coupled ferro-/antiferromagnet thin films¹

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The most prominent feature observed in exchange-coupled ferromagnetic/ antiferromagnetic (FM/AF) bilayers is the so-called exchange bias field (H_{EB}), i.e. the shift of the hysteresis loop along the magnetic field axis. However the exchange bias phenomenon can induce other interesting effects on the FM. In this talk we show two methods to establish a bi-domain state in the FM, due to the coexistence of domains with opposite sign of H_{EB} [1-3]. Magneto-optical, polarized neutron and soft X-ray measurements show that this lateral structure becomes more complex for low magnetocrystalline anisotropy materials where a spin depth profile is created in the FM due to the exchange coupling with the AF [4-6]. The internal magnetic structure in the AF and its role on exchange bias has also been investigated using FM/AF/FM trilayers. These studies demonstrate that the bulk spin configuration in the AF plays a crucial role in the pinning of uncompensated spins at the interface thus determining the H_{EB} . Supported by the US-DOE, European Marie-Curie-OIF and the Alfred P. Sloan Foundation. [1] O. Petravic et al. Appl. Phys. Lett. 87, 222509 (2005) [2] I. V. Roshchin et al. Europhys. Lett. 71, 297 (2005) [3] J. Olamit et al. Phys. Rev. B 72, 012408 (2005) [4] R. Morales et al. Appl. Phys. Lett. 89, 072504 (2006) [5] S. Roy et al. Phys. Rev. Lett. 95, 047201 (2005) [6] Z-P. Li et al. Phys. Rev. Lett. 96, 217205 (2006)

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