NUMERICAL SIMULATIONS OF MAGNETIZATION REVERSAL PROCESSES IN AN ULTRATHIN COBALT FILM

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9.7 cm

Magnetization reversal processes and domain structures in ferromagnetic ultrathin $Au/Co/Au$ sandwiches deposited on glass substrates were investigated by magneto-optical magnetometry and microscopy. At the studied Co thickness these films show magnetic uniaxial anisotropy. Magnetic after-effects were observed in a field applied perpendicular to the film plane. The relaxation of the magnetization can be studied either after reversing the field from a saturated value Hs¿0 to Hp¡0 up to reach the M=0 demagnetized state or using the inverse procedure. The magnetic nonreversibility between these two procedures is due to the existence of a quasi-homogeneous "Swiss cheese" domain state with small magnetically nonreversed regions. The magnetization dynamics are well described by numerical simulations in a patchy media with distribution of the local coercivity. However this model fails if one starts from a demagnetized state produced after application of a large in-plane field. This state, characterized by domains with size smaller than the optical resolution, is much softer than that obtained in a perpendicular field-induced demagnetising process. A new extended model is proposed in the present work which accounts of the sample morphology. The coupling between cobalt patches is then assumed to depend on the nature of gold crystallites. This new model well describes the above phenomenon.

13.4 cm

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