

Magnetostatic bias in soft/hard multilayers based on amorphous ribbons and microwires

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Exchange bias effects are observed typically in multilayered or granular systems as a consequence of the different ferro/antiferromagnetic character of neighbouring layers. Such a bias effect gives rise to asymmetric hysteresis loops and a magnetic response that is employed in technological spintronic devices.

In the present work we introduce a different kind of biasing effect of magnetostatic origin that has been observed in multilayered systems with planar and cylindrical geometry. Such systems, magnetically bi-phase, consist of an ultrasoft magnetic phase with amorphous structure, prepared by rapid quenching techniques, and an electroplated magnetic outer layer with relatively hard magnetic character. As ultrasoft materials we have considered amorphous ribbons and glass-coated amorphous microwires of FeCoSiB general composition. The outer layers (actually microtube in the case of cylindrical geometry) are CoNi alloys.

As a consequence of the magnetostatic coupling between soft and hard layers the low-field loops of the soft phase are shifted. The characteristics of this magnetostatic bias effect, proportional to the outer layer thickness, are described. Finally, some derived technological applications are outlined.