

Exchange Spring Effects in FePt/Fe(Co)/⁵⁷Fe multilayers

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FePt system is of large interest due to its high magnetocrystalline anisotropy and perspectives as new magnetic recording media. The ordered L10 FePt superlattice phase is hard magnetic. In structures where this phase co-exists with soft magnetic phases, an exchange coupling magnet, based on the exchange spring effect may be obtained. We have prepared by ion beam sputtering multilayers made of FePt(L1₀)/Fe(Co)/⁵⁷Fe/Fe, with the purpose to investigate the exchange coupling between the hard FePt and the soft Fe(Co) layers. This kind of systems exhibits the exchange spring effect. An external magnetic field applied non-collinearly with respect to the easy axis, induces a twist of the magnetic moments that depends on the magnitude of the field. The reversible nature of this mechanism renders this system to be a magnetic exchange spring. In particular, the thin probe layer of ⁵⁷Fe is deposited with the aim of probing, by Mossbauer spectrometry, the gradual reversal of soft magnetic moments that describes the exchange spring effect. Detailed magnetic measurements obtained with VSM at various temperatures are correlated with structural and Mossbauer data in order to probe this effect. Remanence enhancement as in the case of exchange coupled nanocomposite magnets is obtained in these multilayers.

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