

Hard magnetic Fe-Pt alloys prepared by cold-deformation

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Abstract: Tetragonal FePt is a ferromagnet with large magnetocrystalline anisotropy. The renewed interest in this system arises from possible applications, in particular for recording media and magnetic microsystems. FePt magnetic foils have been prepared by cyclic co-rolling of Fe and Pt foils down to the nm scale (total thickness of multilayer ≈ 100 nm), followed by heat-treatment in the temperature range 300°C to 700°C. The formation of the high anisotropy L_{10} FePt phase results from controlled diffusion and ordering. Coercivities of above 1 T are reached at room temperature following annealing at 450°C for 48 h. This is the highest value reported for bulk FePt. The differences between in-plane and out-of-plane magnetisation processes reveal that demagnetising fields are not simply proportional to the mean magnetisation. In Fe-rich FePt alloys, the hard FePt phase and the soft Fe_3Pt phase coexist. Out-of-plane magnetization reversal is described in terms of the dipolar-spring concept. © 2003 Elsevier Science B.V. All rights reserved.

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