Infulence of surface morphology on perpendicular magnetic anisotropy of nanoporous Co/Pd multilayers and CoPd alloy thin films

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Nanoporous magnetic thin films exhibit very different properties from those of continuous films. The present work is focused on the magnetic Co/Pd multilayers (ML) deposited on nanoporous Al_2O_3 templates with different pore diameters (10 – 35 nm). The studies concern the properties of as deposited and annealed in vacuum at 300°C. To determine the contribution of pore morphology to magnetic properties of the system, Co/Pd ML on flat Si substrate was also prepared. SEM imaging confirmed nanoporous morphology of the films before and after annealing. All nanoporous films preserved perpendicular magnetic anisotropy with $K_{eff} \approx 0.5 - 1.0 \cdot 10^6 \ \frac{erg}{cc}$. However, after annealing a twofold decrease of coercive field was detected. MFM imaging of antidots before and after annealing showed complicated magnetic contrast with small magnetic domains. We also observed the areas with magnetic moments distortion from perpendicular direction connected with complex distribution of magnetic material on developed surface of antidots.

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