

Formation of ordered FePd L₁₀ phase in Fe/Pd multilayers deposited on nanoporous templates

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Nanoporous oxide materials are used as substrates for nanostructuring of magnetic thin films to modify their magnetic properties. FePd alloys with ordered L₁₀ structure possess high coercive field (H_C) and effective magnetic anisotropy constant (K_{eff}). To obtain the ordered L₁₀ phase, annealing or impulse heating is required. In present work, Fe/Pd multilayers deposited on flat Si and on nanoporous TiO₂ and Al₂O₃ templates were annealed in vacuum at temperatures 450 – 600°C to form alloy with L₁₀ structure. The changes of the morphology, magnetic properties and ordering degree of FePd alloys as a function of annealin temperature were investigated. It was shown, that annealing at temperatures above 530°C resulted in the formation of L₁₀ phase with in – plane magnetic anisotropy for all types of templates. The relationship between the degree of L₁₀ phase order and substrate morphology was observed. The template topograph also influences coercivity and shape of the hysteresis loop of FePd films but did not affect effective magnetic anisotropy constant, which maintains the level of $10^6 \frac{erg}{cc}$.

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