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Domain structure and magnetization reversal mechanism in Co/Pd nanopatterned multilayer

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Fabrication and modeling of patterned thin films with perpendicular magnetic anisotropy rise great interest due to their wide applications in magnetic storage, sensors and magnonic crystals. A good representative of such systems are well-ordered arrays of magnetic antidots and dots based on Co/Pd multilayers, where magnetic reversal mechanisms strongly depend on the array geometry [1, 2]. We attempt to understand and reproduce the observed magnetic properties and domain structure appearing in the arrays by micromagnetic simulations performed using Mumax3 software [3]. In particular, changes in coercivity field, magnetic anisotropy constant and magnetic domain arrangement were studied and correlated with symmetry and size of nanostructures. The domain pattern simulations shed light on the details of formation the Néel domain walls, as compared to Bloch walls, depends on the distances between the antidots. The calculations show how edge effects, defects and inhomogeneity affect magnetization reversal and domain wall pinning mechanism, which helps to design similar patterned systems with the specific magnetic properties.

Summary

Topic

1. Nanomagnetism and Spintronics

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