Magnetic reversal mechanism and domain pattern in thin films with perpendicular magnetic anisotropy for different angular orientation, shape, and arrangement of antidots

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Theoretical studies, especially micromagnetic simulations are powerful method in terms of investigation of a complex magnetic systems which are difficult to obtain in experimental techniques. Our work is focused on magnetic reversal and domain pattern formation in antidot arrays with perpendicular magnetic anisotropy. The effect of the lattice symmetry with different arrangement (triangular, square, quasicrystalline and random), antidot size, shapes (triangles, squares and crosses) as well as their angular orientation has been investigated. Simulations are performed by solving the Landau-Lifshitz-Gilbert equation and finding the system's energy minimum for model with intrinsic and extrinsic defects. Rotation of the antidots around their centers has an affect in coercivity values and also domain sizes especially in the systems with square and cross-shaped antidots. The results are discussed in terms of the local shape anisotropy and equilibrium positions of domain walls.

References:

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