Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Concave nanomagnetic triangles: size and shape effect on the anisotropy and magnetization switching ALEXANDER KOZHANOV, TERENCE FISHER, ALEXANDER ANFEROV, Georgia State University, IGOR EREMIN, IVAN VASILYEVSKIY, National Research Nuclear University "MEPhI"
— Single domain nanomagnets are essential for magnetic memory and non-volatile logic applications. Recently a non-volatile logic device based on the triangular nanomagnet was proposed. Dependent on the triangle's shape and dimensions "Y" or "buckle" magnetization alignment ground states are defined by configurational anisotropy. Triangle shape distortions such as corner rounding results in preferable "buckle" ground state not favorable for nonvolatile logic applications. In this work we investigate the effect of triangle dimensions and shape on the configurational anisotropy and magnetization ground state profile. 50μm $\times$ 50μm arrays of 50-500nm aside equilateral permalloy triangles capped with Al layer were fabricated. Arrays of triangles with different corner radius, amount of concavity and vertex extrusion were fabricated. Field modulated MOKE technique was used to characterize triangle anisotropy. Micromagnetic simulations accompanied the experimental results and were used to investigate the ground states magnetization alignment, energy profile and switching dynamics. We demonstrate that triangle shape variations can be used to effectively manipulate its anisotropy profile, ground state stability and switching times. We map the "Y" and "buckle" triangle ground state diagram in the concavity-corner rounding-vortex extrusion parameter space. The investigated triangle shapes are assessed for the non-volatile logic applications.

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Date submitted: 15 Nov 2013 Electronic form version 1.4