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Configurational Anisotropy and Single Domain Behavior in Sub-Micron Square Nickel Dots[1] DANIEL ENDEAN, E. DAN DAHLBERG, University of Minnesota — Magnetic thin films patterned as regular polygons discourage the formation of a vortex magnetic state in favor of single domain behavior due to the presence of sharp corners. We report on measurements of the magnetic properties of Nickel films patterned as isolated square dots with side lengths varying from 1 micron down to 100 nm and thicknesses of 10 nm. The magnetic field dependence of the dot magnetization is probed using a 4-terminal resistance measurement through the anisotropic magnetoresistance (AMR) effect. By measuring the resistance analog of a hysteresis loop, we observe single domain behavior consistent with the presence of 4-fold configurational anisotropy energy. Using a Stoner-Wohlfarth model, we quantify the magnitude of the anisotropy through the easy axis coercivity and the rotational hysteresis and compare to micromagnetic simulations.

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