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Fabrication and structural characterization of ordered magnetic nanodot arrays over large area[1] CHANG-PENG LI, IGOR V. ROSHCHIN, XAVIER BATLLE[2], IVAN K. SCHULLER, Physics Dept., UCSD, La Jolla, CA, USA — Self-assembly of nanopores in anodized alumina is of much interest as a controlled fabrication method of magnetic nanostructures for fundamental studies and potential magnetic recording applications. Up to 10 micron thick Al films are e-beam evaporated on N-type Si substrate for porous alumina mask fabrication. By controlling anodization conditions, hexagonally ordered pores with 8-125 nm diameter and 20-160 nm periodicity are formed over $\sim$1 cm^2 area. SEM and AFM characterization shows that the pores are distributed within $\sim$10% standard deviation from the mean value. Fe magnetic nanodot arrays are fabricated by subsequent e-beam evaporation of Fe and mask lift-off. The smallest dot array fabricated this way is 44 nm, which corresponds to 0.4 Tbit/in^2 density. The nanodot periodicity is confirmed by small angle neutron scattering measurements. For nanoscale exchange bias studies, Fe/FeF_2 bilayer nanodot array are prepared using low angle Ar ion etching instead of the lift-off.

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