Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Size-tuned Highly-ordered Magnetic Nanodot Arrays via ALD-Assisted Block Copolymer Nanolithography[1] SRINIVAS POLISETTY, CHUN-HAO LIN, WAYNE L. GLADFELTER, MARC H. HILLMYER, CHRIS LEIGHTON, University of Minnesota - Twin Cities — Block copolymer nanolithography of large-area well-ordered magnetic nanostructures is now possible *via* a variety of approaches and holds considerable appeal for fundamental science and for bit patterned recording media. Here, we demonstrate a non-lift-off damascene-type approach [1] combined with low temperature atomic layer deposition (ALD) of a conformal ZnO layer to provide size-controlled magnetic nanodots. Perpendicularly-aligned nonporous templates were achieved by solvent annealing polystyrene-*b*-polylactide (PS-PLA) films. Low temperature ALD was then used to conformally coat the template with a ZnO layer of variable thickness to systematically reduce the pore diameter. Our damascene-type non-lift-off process [1] was then used to synthesize $Ni_{80}Fe_{20}$ dot arrays from such templates, achieving tunable dot diameters (6-30 nm) and controlled dot height (by Ar milling time). Magnetic measurements were used as a probe of island volume, good agreement being obtained between simple calculations, imaging, and blocking temperature measurements. The results demonstrate a simple route to size control from a fixed polymer template, enabling detailed studies of separation-dependent inter-dot magnetic interactions for example.

[1] Baruth, *et al.*, *ACS Appl. Mater. Interfaces* **3**, 3472 (2011).

[1]This work was supported primarily by the NSF through the University of Minnesota MRSEC under Award Number DMR-0819885.

Srinivas Polisetty
University of Minnesota - Twin Cities

Date submitted: 14 Nov 2013 Electronic form version 1.4