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Magnetization reversal of patterned disks with perpendicular magnetic anisotropy ZHUYUN XIAO, XIAO WANG, X.M. CHENG, Department of Physics, Bryn Mawr College, YAOHUA LIU, SUZANNE G.E. TE VELTHUIS, Materials Science Division, Argonne National Laboratory, DANIEL ROSENMANN, RALU DIVAN, Center for Nanoscale Materials, Argonne National Laboratory —
Magnetic vortex dynamics in magnetic disks have been extensively studied. However, spin dynamics in magnetic disks with perpendicular magnetic anisotropy (PMA) still remain to be fully understood. Magnetic configurations in disks with strong PMA are more complicated than magnetic vortices, resulting in novel spin dynamics with potential applications. In this work, we study the magnetization reversal of Co/Pd multilayered disks with PMA. Magnetic disks (3-8 microns in diameter) with the structure of [Co (0.3 nm)/Pd (0.5 nm)]$_5$/Co(0.3nm) were patterned on Si substrates via direct laser writing lithography, electron beam evaporation, and lift-off methods. A Kerr microscope was used to image magnetization reversal processes at various bias fields. The imaging results revealed a nucleation dominated magnetization reversal process with the growth of dendritic domains. The coercivity of the disks is significantly bigger than that of thin films with the same structure. Quantitative analysis of the real time Kerr imaging results shed light on the magnetization reversal mechanism of the patterned disks with PMA. Work at Bryn Mawr is supported by NSF under Grant No. 1053854. Work at Argonne National Laboratory and use of the Center for Nanoscale Materials was supported by the U. S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

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