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Magneto-Optical Study of Lithographically Patterned Ferromagnetic Multilayer $(Co/Pt)_8$ Micro-Channels[1] ALEXIS BOWERS, Lock Haven Univ, NITIN SAMARTH, SUSAN KEMPINGER, ROBERT FRALEIGH, Pennsylvania State University — Controlled domain movement in magnetic structures has become promising for applications in magnetic memory systems and data processing. This study examines magnetic domain nucleation and propagation within a series of lithographically patterned Co/Pt micro-channels with perpendicular magnetic anisotropy (PMA). Magnetic domains are nucleated and then manipulated using out-of-plane sweep protocols and studied in situ using magneto-optical Kerr effect (MOKE) imaging. Co/Pt multilayers were fabricated with optical lithography and sputter deposition. Effects of channel width and annealing are presented. Annealing the Co/Pt after fabrication as a function of time and temperature resulted in increasing the coercivity of the unpatterned film, decreasing the coercivity of the micro-channels, and reducing the average domain size in both. Atomic force microscopy (AFM) characterization of the micro-channels showed non-uniform deposition near feature edges. MOKE imaging demonstrated that the feature edges had a much lower coercivity (70G) than the middle of the channel/pad (150G) or the unpatterned film (250G). We found that an oscillating field protocol to re-initialize soft domains near feature edges proved to be more effective than a traditional field sweep to initialize a domain wall in the channel. Once a domain wall was formed, we explored a combination of constant and pulsed field protocols to manipulate the domain wall.

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