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Large-area patterned substrates for micromagnetic actuation of superparamagnetic microbeads MINAE OUK, GEOFFREY S.D. BEACH, Massachusetts Inst of Tech-MIT — Superparamagnetic microbeads(SBs) have been used to capture and manipulate biological entities in a fluid environment. Chip-based magnetic actuation provides a means to transport SBs in lab-on-a-chip technologies. This is accomplished using the stray field from patterned magnetic microstructures [1], or domain walls in magnetic nanowires [2]. Recently many studies have focused on the submicron-size antidot array of magnetic materials because non-magnetic holes affect the micromagnetic properties. Here, we use photolithographic patterning to create periodic anti-dot arrays in Co thin films, show the transport of SBs across large distance by a rotating field. We describe the dynamics of bead motion, highlighting the key factors to control bead transport. We show there is a critical threshold for both in-plane and out-of-plane components that must be exceeded for bead motion to occur. The threshold values are different depending on direction, which allows for directionally-anisotropic transport across the chip surface. Hence the periodic magnetically-patterned substrates can be used to digitally separate magnetic beads and augment microfluidic actuation for long distance transport.[1]B. Yellen, et al., Lab Chip, 7, 1681 (2007) [2]E. Rapoport and G. S. D. Beach, APL 100, 082401 (2012)

Minae Ouk
Massachusetts Inst of Tech-MIT

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