Abstract Submitted
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Large-area patterned substrates for micromagnetic actuation of superparamagnetic microbeads[1] MINAE OUK, GEOFFREY BEACH, Massachusetts Inst of Tech-MIT — Superparamagnetic microbeads (SBs) are widely used to capture biological entities in a fluid environment. Chip-based magnetic actuation provides a means to transport SBs in lab-on-a-chip technologies. This is usually accomplished using the stray field from patterned magnetic microstructures [1], or domain walls in magnetic nanowires [2]. However, lithographic patterning over a large area is costly and impractical using conventional techniques such as electron beam lithography. Here we use a simple floating-transfer technique [3] for large-area self-assembly of polystyrene microspheres on a Si wafer to produce lithographic masks texturing a substrate. Hexagonal patterns are used as lift-off and etching masks to create magnetic dot and anti-dot arrays in CoFe thin films, with a size and spacing that can be tuned via sphere diameter and RIE etch time. Using a rotating magnetic fields, we show that these magnetically-patterned substrates can transport SBs across large distances on the wafer surface, opening the possibility to augment or replace 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) [3] X. Ye and L. Qi, Nano Today 6, 608 (2011)

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