Abstract Submitted
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Remotely Tunable Mobile Magnetic Traps from Domain Walls in Patterned Magnetic Wires G. VIEIRA, T. HENIGHAN, A. CHEN, A. J. HAUSER, F. Y. YANG, R. SOORYAKUMAR, The Ohio State University Department of Physics — Remote manipulation of fluid-borne magnetic particles on a surface is useful to probe, assemble and sort micro- and nano-scale objects. In this study, magnetic domain walls in a-few-micron-wide magnetic wires patterned on a surface are shown to act as effective traps for such objects. The required characteristics of the magnetic domain walls are designed with the aid of micromagnetic simulations and the magnetization profiles in the wires observed by Kerr microscopy. Using small (∼50 Oe) in-plane and out-of-plane external magnetic fields, the trapping energy profile of the surface can be altered without significantly changing the magnetization of the wire, allowing for the trap to become mobile. Calculations reveal field gradients of greater than 10^4 T/m at a distance of 500 nm from the domain walls and tunable forces of 10-100's of picoNewtons applied to magnetic micro-particles in fluid environments. Several examples of micro- and nano-particle manipulation will be presented.

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