Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Separating Magnetically Labeled and Unlabeled Biological Cells within Microfluidic Channels TOM BYVANK, GREG VIEIRA, The Ohio State University Department of Physics, BRANDON MILLER, BO YU, JEFFREY CHALMERS, L. JAMES LEE, The Ohio State University William G. Lowrie Department of Chemical and Biomolecular Engineering, R. SOORYAKUMAR, The Ohio State University Department of Physics — The transport of microscopic objects that rely on magnetic forces have numerous advantages including flexibility of controlling many design parameters and the long range magnetic interactions generally do not adversely affect biological or chemical interactions. We present results on the use of magnetic micro-arrays imprinted within polydimethylsiloxane (PDMS) microfluidic channels that benefit from these features and the ability to rapidly reprogram the magnetic energy landscape for cell manipulation and sorting applications. A central enabling feature is the very large, tunable, magnetic field gradients ($> 10^4$ T/m) that can be designed within the microfluidic architecture. Through use of antibody-conjugated magnetic microspheres to label biological cells, results on the transport and sorting of heterogeneous cell populations are presented. The effects of micro-array and fluid channel design parameters, competition between magnetic forces and hydrodynamic drag forces, and cell-labeling efficiency on cell separation are discussed.

Tom Byvank
The Ohio State University Department of Physics

Date submitted: 18 Nov 2010 Electronic form version 1.4