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**Mobile magnetic traps for manipulation of magnetically labeled and unlabeled cells**[1] THOMAS HENIGHAN, AARON CHEN, GREG VIEIRA, ADAM HAUSER, FENGYUAN YANG, Ohio State University Physics, JEFFREY CHALMERS, Ohio State University Chemical and Biomedical Engineering, RATNASINGHAM SOORYAKUMAR, Ohio State University Physics — Magnetic forces are frequently used for the manipulation of biological cells because magnetic fields are typically easier to use and have fewer effects on the cells than optical or electrical fields. While magnetic forces are typically used for bulk separation, it is considerably harder to magnetically manipulate a single cell, or a small number of cells. In this study we employ reprogrammable magnetization profiles created through lithographically patterned ferromagnetic disks as a template for producing highly localized trapping fields. The resulting magnetic field gradients can be modulated by an external magnetic field enabling directed forces to be applied on, (a) single, or a small number of immunomagnetically labeled biological cells and, (b) magnetic microspheres that act as magnetically actuated force transmitting probes to navigate fluid-borne unlabeled cells with micrometer precision. We demonstrate the mobile traps by remotely transporting and arranging, with programmed routines (*a la* joystick), T-lymphocyte and leukemia cells on the platform. Without producing damage, the forces transport the cells with speeds up to 20 microns/sec across a silicon platform to predetermined sites.

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