# Object Manipulation in Microfluidic Devices

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Microfluidic devices have been attracting scientific and industrial attention since they utilie very small sample volume and they significantly enhance the speed of medical research and discovery by performing analyses at much higher rates compared to traditional biological laboratories. In this paper, we demonstrate that photonic momentum transfer through the use of optical tweezers [3-5] can be utilized for trapping and manipulating organic and inorganic objects within fluidic channels. Microfluidic devices have been fabricated by polydimethylsiloxane (PDMS) elastomer molding of patterns lithographically defined on a thick negative photoresist. Polystyrene microspheres and live biological cells are trapped and redirected by optical manipulation within the fluidic channels. We show that cells are more difficult to manipulate with optical trapping due to their lower dielectric constant, and their rapid manipulation may require higher power optical traps. Viability studies have shown that cells continue to exhibit spreading functions after being manipulated inside the fluidic channels. Optical trapping and patterning will have applications in creation of active cellular arrays for cell biology research, tissue engineering, cell sorting and drug discovery.