Public Abstract
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Title:A MEMS BASED COULTER COUNTER FOR CELL SIZING

This paper presents the design and fabrication of MEMS based Coulter counter designed to monitor cellular volumetric changes after an exposure to various media. The design consists of a thick SU8 channel which is divided into mixing, focusing, and measuring regions. The mixing region is a serpentine shaped channel, enabling complete mixing of a sample and a reactant before entering the focusing region. The focusing region consists of an electrode pair used to generate AC fields that result in negative dielectrophoretic forces directing cells from all directions to the center of the channel to prevent clogging of the channel. Finally, the measuring region consists of a channel of width ranging from 20-25 microns, with multiple electrode pairs fabricated using electroplated gold in order to measure the change in impedance at different points along the channel as a cell passes through. This device improves upon existing macro-scale Coulter counter technology by allowing extremely small sample sizes (101 compared to 105 cells per experiment), an extremely short time frame from the exposure to reactant media to the initial measurement, serial time series measurements of a single cell, and light microscopic monitoring of the experiment. The design of this chamber will allow for the manufacture of cell specific channel diameters in order to maximize measurement precision for each cell type. This design also eliminates the sheath flow and complex fluid control systems that make conventional cytometers bulky and complicated.