A MEMS BASED COULTER COUNTER FOR CELL SIZING

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ABSTRACT

Detection and classification of cells forms an important aspect of medical research in diagnosing diseases and finding remedies at the cellular level. Miniaturized cell detecting devices are desirable not only for on site biomedical analysis but also for *in situ* monitoring of cell dynamics.

This research presents the design and fabrication of a MEMS based Coulter counter for monitoring cellular volumetric changes after an exposure to various media. The device is based on three important phenomena: 1) Passive mixing of the reagents, 2) Dielectrophoretic focusing of the cells and 3) Electrical impedance based sensing mechanism.

This device improves upon existing macro-scale Coulter counter technology by allowing extremely small sample sizes (10^1 compared to 10^5 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 optical microscopic monitoring of the experiment. Finally, the design of this device will allow for the manufacture of cell specific channel diameters in order to maximize measurement precision for each cell type.