Microfabricated Fluorescence-Activated Cell Sorter

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A disposable microfabricated fluorescence-activated cell sorter (? -FACS) for sorting various biological entities which allows high sensitivity, no cross-contamination and lower cost than conventional FACS machines will be presented. The actual sorting is performed on a disposable microfabricated chip with a detection volume of ~250 femtoliters. This microfluidic chip is a silicone elastomer impression of an etched silicon wafer mold that forms a "T" arrangement of channels with 5x4 ? m dimensions. Currently, we use electro-osmotic flow to manipulate cells through the device and sort them to either side of the "T". A high NA immersion objective for conventional fluorescence detection is used to identify the desired cells. We used ? -FACS to obtain substantial enrichment of micron-sized fluorescent beads with different emission wavelengths, having 33,000 beads/hour throughput. Furthermore, we have separated *E. coli* expressing green fluorescent protein from a background of non-fluorescent *E. coli* cells with enrichments up to 30 fold and shown that the bacteria are viable after extraction from the sorting device. Other sorting algorithms can also be implemented on the chip that conventional FACS cannot accomplish. These sorters can function as stand-alone devices or as components of an integrated microanalytical chip.