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Evaluation of microfluidic Chips for Cell-sorting Applications CAROLYN REN, University of Waterloo, JAY TAYLOR, thinXXS Microtechnology AG, G.D. STUBLEY, University of Waterloo — The design of a miniaturized cell-sorting device must follow strict parameters such as applied voltage, efficiency of cell-separation, repeatability, size, flow control, and cost, among others. Current designs have achieved successful levels of cell-isolation. However, further improvements in the microfluidic chip design are important for incorporation into larger systems. This study evaluates specific design modifications that contribute to reduce required applied potential aiming for portable devices, improved operation reliability by minimizing induced pressure disturbance when electrokinetic pumping is employed and incorporating online filters to reduce channel blockage, and improved flow control by incorporating directing streams achieving dynamic sorting and counting. The chip designs fabricated in glass and polymeric materials include asymmetric channel widths for sample focusing, nonuniform channel depth for minimizing induced pressure disturbance, directing streams to assist particle flow control, and online filters for reducing channel blockage. Fluorescence-based visualization of electrokinetic focusing, flow field phenomena, and dynamic cell-sorting demonstrate the advantages of the chip design.

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