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Microfluidic particle manipulation using high frequency surface acoustic waves[1] YE AI, DAVID J. COLLINS, Singapore University of Technology and Design — Precise manipulation of particles and biological cells remains a very active research area in microfluidics. Among various force fields applied for microfluidic manipulations, acoustic waves have superior propagating properties in solids and fluids, which can readily enable non-contact cell manipulation in long operating distances. Exploiting acoustic waves for fluid and cell manipulation in microfluidics has led to a newly emerging research area, acoustofluidics. In this work, I will present particle and cell manipulation in microfluidics using high frequency surface acoustic waves (SAW). In particular, I will discuss a unique design of a focused IDT (FIDT) structure, which is able to generate a highly localized SAW field on the order of 20 m wide. This highly focused acoustic beam has an effective manipulation area size that is comparable to individual micron-sized particles. Here, I demonstrate the use of this highly localized SAW field for single particle level sorting with sub-millisecond pulses and selective capture of particles. Based on the presented studies on acoustic particle manipulation, I envision that the merging of acoustics and microfluidics could enable various particle and cell manipulations needed in microfluidic applications.

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