Abstract

In this paper, we introduce the application of a microfluidic separator for detection and focusing of two different bio-particles with an integrated method utilizing acoustic and dielectrophoretic (DEP) force. In order to improve separation efficiency, we have integrated two different manipulation techniques. The separator designed and simulated rely on the combination of long-range acoustic waves and short-range dielectrophoretic forces. The DEP manipulation is generated by an DC or AC non-uniform electronic field, while, acoustic force created using IDTs (Inter Digitated Transducers) patterned on a piezoelectric substrate such as Linbo3 (Lithium Niobate) to generate standing surface acoustic waves. The generated waves move through the PDMS (Polydimethylsiloxane) microchannel located between two same IDTS. We have two different separation steps. In the first step, particles will face with acoustic force to be focused in midline of the microchannel. In the second step, focused particles, will separated with a non-uniform electric field generated by metric 3D electrodes of Al (Aluminum) mold to the channel wall. These particles will separate and move to the different outlets. First kind of particles have a different manner of the second ones based on differ of their electrical
properties. We counted the number of particles in the two different outlets at the end of separating process. Particles numbers showed a well separation efficiency. The method mentioned above is a process that is enough flexible to utilize in a variety of applications especially in biological purposes.

References


Index Terms

Computer Science

Applied Sciences

Keywords

Acoustic force, Dielectrophoresis, BioMEMS, Bioparticle