World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:12, No:05, 2018

A Simplified, Fabrication-Friendly Acoustophoretic Model for Size Sensitive Particle Sorting

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Abstract : In Bulk Acoustic Wave (BAW) microfluidics, the throughput of particle sorting is dependent on the complex interplay between the geometric configuration of the channel, the size of the particles, and the properties of the fluid medium, which therefore calls for a detailed modeling and understanding of the fluid-particle interaction dynamics under an acoustic field, prior to designing the system. In this work, we propose a simplified Bulk acoustophoretic system that can be used for size dependent particle sorting. A Finite Element Method (FEM) based analytical model has been developed to study the dependence of particle sizes on channel parameters, and the sorting efficiency in a given fluid medium. Based on the results, the microfluidic system has been designed to take into account all the variables involved with the underlying physics, and has been fabricated using an additive manufacturing technique employing a commercial 3D printer, to generate a simple, cost-effective system that can be used for size sensitive particle sorting.

Keywords : 3D printing, 3D microfluidic chip, acoustophoresis, cell separation, MEMS (Microelectromechanical Systems), microfluidics
Conference Title : ICBDSSP 2018 : International Conference on Biomedical Devices, Sensors and Signal Processing
Conference Location : Montreal, Canada
Conference Dates : May 24-25, 2018