

Abstract Submitted
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Size based separation of micro-particles using adhesive ciliated surfaces ANURAG TRIPATHI, Dept. of Chemical and Petroleum Engineering, University of Pittsburgh, Pittsburgh, PA, 15261, AMITABH BHATTACHARYA, Dept. of Mechanical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai, India, ANNA BALAZS, Dept. of Chemical and Petroleum Engineering, University of Pittsburgh, Pittsburgh, PA, 15261 — Separation of different size micro-particles in microfluidic devices is important for many biomedical applications. Various techniques ranging from active dielectrophoresis to passive separation using the concept of inertial microfluidics have been used previously. We propose a novel separation mechanism of micro-particles using active cilia arrays with adhesive tips. A near complete separation of micro-particles can be achieved for low Reynolds number ($Re \sim 0.1$) regime where separation mechanisms based on inertial effects will be of little use. By means of Lattice Boltzmann simulations, we show that mixture of two different size particles with size ratio greater than or equal to two can be nearly completely separated by tuning adhesion strength, actuation frequency and cilia stiffness.

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