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Abstract
This research studied the design and fabrication of microfluidic chip with micro cylindrical posts array for separating and concentrating micro particles. The micro cylindrical posts array, with diameter of 50μm, and height of 45μm for each post, was made of SU-8 in the microchannel by MEMS technology. The micro particles were separated by dielectrophoretic force from the non-uniformly distributed electric field, created by DC current on the two electrodes at ends of microchannel, around the cylindrical post array.
The items studied are: （I）Design two types of cylindrical posts array (staggered type, and in-line type) inside of microchannel,（II） Simulation of particle separation phenomenon by commercial software, CFDRC,（III）Test and analysis the particle separation effects by dielectrophoretic force around micro cylindrical posts array.
In the simulation and experiment, the conductivity of micro particles (Latex sphere at diameter of 16 μm) and buffer liquid (DI water) are 0.009S/m and 0.01S/m respectively. From the results of simulation, the non-uniformly distributed electric field, created by DC current on the two electrodes at ends of microchannel, around the cylindrical post array was observed for both types of cylindrical posts array. The experimental results showed the minimum voltage required to move the micro particles are 20V and 50V for electrode space at 0.8cm and 2.5cm respectively, for each type of cylindrical posts array. In the experiment of the electric field strength at 60V/mm, the micro particles were polarized and acted by negative dielectrophoretic force, to separate from buffer liquid and to congregate in the low electric field region around micro cylindrical posts. If the electric field strength was increased to 110V/mm, the movement of micro particles was also increased by electrokinetic effect, which result each micro post trapped single particle at stronger dielectrophoretic force region. Both simulation and experiment revealed the micro particles, under the dielectrophoretic effect, were able to concentrate around micro cylindrical posts and separate from flowing fluid. This phenomenon is feasible in biochip for automatic separation and manipulation of biological particle.
Keywords：MEMS technology, dielectrophoretic force, micro cylindrical posts array
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