

Performance of diffuser-nozzle micropump actuated by magnetic force

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Micropump, which is used for fluid delivery application, is one of the essential devices for integrated micro systems. A magnetically actuated micropump for controlling liquid samples in microfluidic devices is presented. The pump is fabricated using soft lithographic technique with poly dimethylsiloxane(PDMS). The diaphragm of microchamber includes a NdFeB magnet, and the pump is actuated by a permanent magnet of a magnetic stirrer.

With respect to design of micropump, pumps with various dimensions (neck width, length, and divergence angle of diffuser element) were tested. The magnetically actuated micropump induces reciprocating fluid flow. Frequency and back pressure dependency of pumping performance were examined. And various fluids were utilized as working fluids to investigate the relation between pump performance and viscosity. Unlike the other actuating methods, magnetic actuation by permanent magnet makes the diaphragm distorted. Therefore the pump rate changes depending on rotating direction of the external magnet. Finally, durability of PDMS diaphragm was tested.