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Abstract
This research consists of design, fabrication and phase control system to a biocompatible silicon micropump. The fluids directions could be operated either forward or backward. In blood compatible project, we used two kinds of materials, PEOU (oligo ethylene glycol) and PEG (polyethylene glycol), to form a monolayer on the chip surface using the method of Self-Assembled Monolayers (SAM). Based on the experimental results, PEOU is a better material to resist the adhesion of blood. The pump performance tests including vibration response and flow rate were carried out at different driving signals. The results indicate that the pump performance for blood is lower than that for water because of the difference in fluid properties. The DI water and blood flow rate of the micropump operated at voltage of 140 V were 121.6 μl/min at 500 Hz and 50.2 μl/min at 450 Hz, respectively. The maximum back pressure of micropump at water and blood were 3.2 kPa and 1.8 kPa, respectively. The micropump was able to handle medicines and reagents. The animal's experiments were successful. The micropumps injected PBS and blood into rats for 5 min, the micropumps completed the dosing condition for clinical medicine and can’t influence the physiological function. This pump has great potentials in biomedical applications such as drug delivery microsystems for patients or in clinical care. It can be used to precisely control medicament to improve the conventional treatments.
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