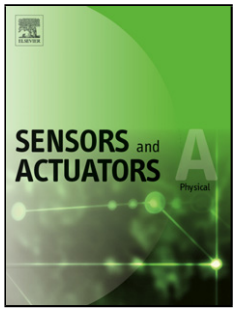

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Digitally controlled portable micropump for transport of live micro-organisms

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Abstract

Laser micromachining has been extensively utilized to fabricate polymer based biomedical devices and is well known for producing high throughput fabrication at very low costs. The laser ablated surfaces are very rough and particularly in those micro-devices which are supposed to handle viable cells other micro-electronically inspired fabrication processes are preferred. During the micro-scale fluidic transport as generated by moving members within active micro-devices and also owing to the interfacial shear level close to the surfaces in both active and passive micro-devices there is a general loss of viability of the transported sample. In this work we have developed a hybrid strategy where the laser manufactured PMMA samples are smoothened by a chemical etching step and so obtained smooth surface is used to fabricate multilayer micropump which is actuated by a piezo disc. The micropump is operable at lower voltage 5-7.5 V DC. The flow rates of our device can be programmed through a micro-controller interface and trials are able to yield a viable transportation of solutions containing micro-organisms. The optimized design of the microfluidic chamber used in this work is able to discharge the whole containment from within the fluid chambers while retaining the cell viability.