OP-6-65

Thursday, May 12, 2011, 03:55-04:15 pm
Room: Karam 1

DESIGN AND REALIZATION OF A FULL-POLYMERIC INJECTION MOULDABLE MULTIFUNCTIONAL MICROFLUIDIC REACTOR

Peter Eduard Neerincx

Polymer Technology, TU/e

P.E.Neerincx@tue.nl

Microfluidic devices as used e.g. in lab-on-a-chip and micro-total-analysis systems, are frequently fabricated using silicon or PDMS (polydimethylsiloxane) based technologies, both with their known disadvantages. Here, we design and realize a full-polymeric multifunctional microfluidic reactor device, using an alternative fabrication method, the two component co-injection moulding technology in which different polymer combinations -generally a flexible and a rigid thermoplastic polymer- can be applied. The prototype device is based on an ambi-symmetrical design, combining two, identical shells, that are each folded to occupy a 160 x 90 [mm2] space and subsequently stacked into a 4 (double) layer system. One microfluidic reactor unit includes 6 different in- and output connections, 6 peristaltic pumps, 18 volume containing control valves, 2 fluid storages, and 2 efficient, splitting, rotating and recombining, serpentine mixers. These mixers realize an almost perfect baker's transformation and possess 10 elements that create 2•106 layers with an individual striation thickness of 0.5 [nm] in 3 seconds. The total reactor volume amounts 7 [mL]. The capacity of the peristaltic pumps, with their stroke of 0.5 [mm], equals about 1 [mL.s-1], determined by the maximum frequency of the actuators of 200 [Hz]. The time needed to flush the reactor equals 10 [s]. One microfluidic device can be endlessly connected to its replicas, and can be actuated either by solenoid actuators or air pressure.