

Cost Effective Microfabrication Technique for Lab on Chip (LOC) Devices Using Epoxy Polymers

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Abstract : Microfluidics devices are fabricated by using multiple fabrication methods. Photolithography is one of the common methods wherein SU8 is widely used for making master which in turn is used for making working chip by the process of soft lithography. The high-aspect ratio features of SU-8 makes it suitable to be used as micro moulds for injection moulding, hot embossing, and moulds to form polydimethylsiloxane (PDMS) structures for bioMEMS (Microelectromechanical systems) applications. But due to high cost, difficulty in procuring and need for clean room, restricts the use of this polymer especially in developing countries and small research labs. 'Bisphenol -A' based polymers in mixture with curing agent are used in various industries like Paints and coatings, Adhesives, Electrical systems and electronics, Industrial tooling and composites. We present the novel use of 'Bisphenol - A' based polymer in fabricating micro channels for Lab On Chip(LOC) devices. The present paper describes the prototype for production of microfluidics chips using range of 'Bisphenol-A' based polymers viz. GY 250, ATUL B11, DER 331, DER 330 in mixture with cationic photo initiators. All the steps of chip production were carried out using an inexpensive approach that uses low cost chemicals and equipment. This even excludes the need of clean room. The produced chips using all above mentioned polymers were validated with respect to height and the chip giving least height was selected for further experimentation. The lowest height achieved was 7 micrometers by GY250. The cost of the master fabricated was \$ 0.20 and working chip was \$. 0.22. The best working chip was used for morphological identification and profiling of microorganisms from environmental samples like soil, marine water and salt water pan sites. The current chip can be adapted for various microbiological screening experiments like biochemical based microbial identification, studying uncultivable microorganisms at single cell/community level.

Keywords : bisphenol-A based epoxy, cationic photoinitiators, microfabrication, photolithography

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