

Micropump pattern replication using Printed Circuit Board (PCB) technology

Abstract

This article shows a low-cost rapid hot embossing poly (methylmeth acrylate) (PMMA)-based micropump replication with printed circuit board (PCB) mold. PCB material offers advantages of low cost, rigid, and rapid thermal response characteristic. Unlike conventional hot embossing setup, the presented process involved the usage of simple machinery tools: laboratory oven (heat transfer), G-clamp (force deliver), and two aluminium plates (isothermal heat plates). Diffuser and pump chamber were successfully imprinted with the depth of 450 μm and verified pump performance with other reported literatures. To avoid complex bonding process between actuator and membrane, electromagnetic pinch actuation is introduced. The micropump poses flow rate characteristic of 6.66 ml/min and a back pressure of 1.6 kPa under optimum pinch frequency.

Keywords

Diffuser; Electromagnetic; Hot embossing; Microfluidic; Micromechanical; Micropump; PCB; Polymers