

Fabrication of Polydimethylsiloxane Microfluidic Device for the Simple Diagnosis of Bio-Sample with a Probe Solution

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In case of the diagnosis for the biologically relevant diseases, it is quiet difficult to obtain a sufficient amount of bio-sample due to the high price and the scarcity of a sample. Thus, the miniaturization of reaction system is an essential factor to overcome the limitation, because the miniaturized devices in the micro-scale do not need a large amount of reagents. By the scale-down to the micro scale, it is possible to detect the results derived from the reaction between two reagents (i.e., the probe solution and bio-sample), with drops in only a few hundred of micro liter. The designs of the microchips were drawn by using the CAD and simulated with the mathematical software, such as the FLUENT 6.1 and COMSOL MULTIPHYSICS 3.4. After the design processes, the devices were fabricated with PDMS (Polydimethylsiloxane) through the sequences of the mixing, curing, surface treatment and bonding. The flow in the microfluidic device is driven by the capillary force and there is no need of additional equipments such as micro-pumps or electric power suppliers on the fabricated chips. The result provides the feasibility of the simple diagnosis for small amounts of bio-sample.