

Control of Droplet Size by an Active Valve in Multilayer Microfluidic Chips

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Microfluidic systems have been widely studied in many research areas such as material chemistry, biochemistry and pharmaceuticals due to easy fabrication and precise controllability. Especially, droplet-based microfluidics has attracted great interest as confining geometries of self-assembly or chemical reactors. However, in most cases, the size of generated droplets was controlled solely by relative flow rates of two different fluid phases.

In this experiment, to control a droplet size without changing the flow rates, we fabricated multilayer microfluidic chips with pneumatic valves by conventional soft lithography. By locating the valves at proper position in the microfluidic chips, droplet size could be controlled. In addition, the phenoma at the valve region were observed with varying the pressure of the pneumatic valve.