

Optofluidic Switch Using Two-Phase Stratified Flows in PDMS Microfluidic Devices

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Optofluidics is a new field of technology to achieve the synergic effects by complementary combining microfluidics and optics. It is noteworthy that the optical devices can be flexible and reconfigurable by introducing fluids. Numerous efforts have been devoted to develop the reconfigurable optical devices such as optical switch. However, most of them are not suitable for the disposable micro-total analysis systems (micro-TAS) because of their high fabrication cost, and incompatibility with liquid analytes and the other parts of integrated devices. In this work, we demonstrated optofluidic switch by using liquid-core/ liquid-cladding waveguide in polydimethylsiloxane (PDMS) microfluidic device. The direction of two-phase stratified flow could be determined by the programmable pneumatic control of elastomeric PDMS membrane. Therefore, light guided by the two-phase stratified flow also could be switched. Various detection demands in micro-TAS can be satisfied in real time using the optofluidic switch.