

UPDATE FROM THE CUTTING EDGE

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Life Science & Technology

Microfluidic flow control based on photo-induced reversible wettability conversion.

Photo-induced super-hydrophilicity on titanium dioxide (TiO_2) was applied to microfluidics as a novel micro valve device. Although the initial hydrophobic property on TiO_2 surface has been hardly reproduced in a minute by optical control, we found out a new phenomenon for reversible wettability conversion using polydimethylsiloxane (PDMS). Here we present the rapid reversible wettability conversion with microsystem of a simple PDMS and TiO_2 substrate by optical control. Furthermore, the micro optical switching valve (MOS/V) based on the super-hydrophilicity has been successfully demonstrated in a model channel. The MOS/V will be useful for a wide applicability in highly integrated micro/nano fluidics.

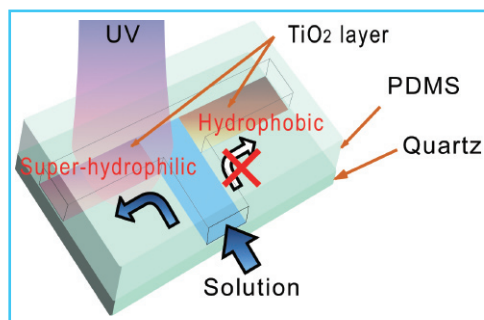


Fig 1: Scheme of Micro Optical Switching Valve (MOS/V).

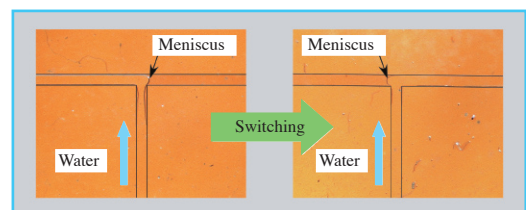


Fig 2: Switching of the flow direction at a MOS/V on T-shaped microchannel.

He-Cd laser was partially irradiated on the TiO_2 surface along the left side of the branched microchannel prior to water injection from the vertical microchannel (left), and then irradiated only the other side of the branched microchannel again in order to switch the flow direction of subsequently injected water (right).

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