Next Generation Autonomous Analytical Platforms for Remote Environmental Monitoring  
Generation of Fully Functioning Biomimetic Analytical Platforms for Water Quality

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Introduction

The development of fully integrated microfluidic devices is still hindered by the lack of robust fundamental building blocks for fluid control. In these devices, valves and pumps are essential for the low control in the microchannels, while simultaneously minimising dead volume. Applications of microvalves and pumps include flow regulation, on/off switching and sealing of liquids and gases. One of the most attractive ways of fluid manipulation on integrated microfluidic platforms is light irradiation, which allows not only for non-contact operation but also independent and remote manipulation of multiple fluids.

Microchip with photoswitchable ionogel microvalves

Fiber Optic setup

Results

Conclusions

Fabrication of the photoswitchable ionogel microstructures was successfully optimised, followed by the incorporation of the ionogel microstructures within hybrid PDMS/glass microchip. Preliminary studies showed a three-dimension change of the valve due to the protonation and the deprotonation processes during white light irradiation. The biggest height change as well as the shortest shrinking time was observed for [P6,6,6,14][NTf2] ionogels. This novel technology would take advantage of the unique properties of these materials, allowing for non-contact and non-invasive valve control within microfluidic devices.

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