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Advances in design position push-button mechanisms for future use in biomicrofluidic applications **FREE**

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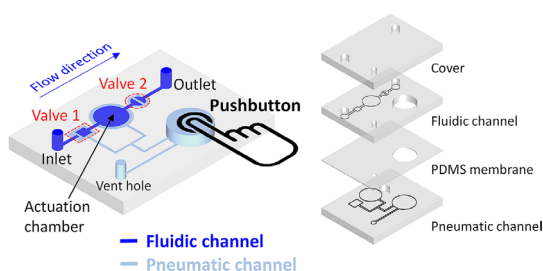
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Approaches incorporating microvalves look to make microfluidic-based diagnostic devices more accessible for point-of-care users.



While microfluidic technology holds promise for medical diagnostics, most of today's applications require an external system for operation that can make devices difficult to use. Numerous approaches have been proposed for making such devices more user friendly.

Park and Park wrote a perspective article identifying recent innovations and looming challenges for using push-button mechanisms in microfluidic-based diagnostic devices. The paper highlights one approach that uses microvalves, which lets devices be repeatedly controlled by push-button.

“By using a push-button, a few microliters of liquid can be controlled on-demand in a standalone microfluidic device,” said author Je-Kyun Park. “Without the use of an external pumping system, we can precisely control various flow behaviors, including dispensing, reciprocating flow, flow direction control, and mixing of multiple reagents with desirable ratios.”

Based on the indirect pressurization method by a polydimethylsiloxane (PDMS) membrane and microvalves, their approach has reduced user-dependent variations in controlled volume regardless of differences in end users. Building a device with these features using multi-layered soft lithography, however, still proves difficult.

“During the fabrication process, valve structures are likely to adhere to the PDMS membrane, causing device failure,” Park said. “We improved this problem by passivating the valve structure physically.”

There remains much room for improvement in terms of integration with signal analysis systems, user-dependent variation, modularization, and semi-automation.

Park said he hopes the review will help orient his field to the hurdles facing push-button microfluidic devices and looks to address these obstacles in future projects.

Source: “Pushbutton-activated microfluidic cartridge as a user-friendly sample preparation tool for diagnostics,” by Juhwan Park and Je-Kyun Park, *Biomicrofluidics* (2021). The article can be accessed at <https://doi.org/10.1063/5.0056580>.

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