

Advancing the Arizona State University Knowledge Enterprise 1475 N. Scottsdale Road, Suite 200 Scottsdale, AZ 85287-3538 Phone: 480 884 1996 Fax: 480 884 1984

## **Microfluidic Valve**

The field of microfluidics has rapidly emerged and been implemented in an array of applications, such as molecular analysis, bio-defense, molecular biology, and microelectronics. Microvalves can be used to control routing, timing, and separation of fluids in many different microfluidic systems. However, current microvalve technology faces challenges associated with material composition, mechanical complexity, and flow control. For example, the use of dendritic chalcogenides for microfluidic valves has been hampered due to the fact that contact between the fluid and the materials can lead to fluid contamination. Therefore, there is a need for a high-performance microvalve that prevents contamination.

Researchers at Arizona State University have invented a microfluidic valve based on parylene-capped chalcogenide dendrites. This simple, low voltage valve controls fluid flow in microfluidic systems through the electrodeposition of nanoscale metal elements beneath a protective layer which isolates the valve from the fluid being controlled. The reversible petal effect relies on the growth or retraction of nanoscale metallic dendrites to change the dynamic condition at the interface between the fluid and the channel surface. This effectively regulates the fluid flow. Additionally, the parylene capping layer prevents chalcogenide contamination without impairing the functionality of the valve.

Potential Applications

- Lab-on-a-chip
- Diagnostic medical devices
- Bio-defense
- Microelectronics

Benefits and Advantages

- Low voltage Fully operational in low-voltage conditions.
- Eliminates risk of contamination The parylene capping layer prevents contamination without hindering valve operation.
- Increased flow control The microfluidic value is programmable and easier to control.
- Lower cost This method is less expensive to use and produce than previous technologies.

For more information about the inventor(s) and their research, please see

Dr. Michael Kozicki's directory webpage

Dr. Junseok Chae's directory webpage

## Inventors

Case ID:M16-060P Published: 8/24/2016

Michael Kozicki Junseok Chae

## Contact

Shen Yan shen.yan@skysonginnovations. com