

# Chemical Technology

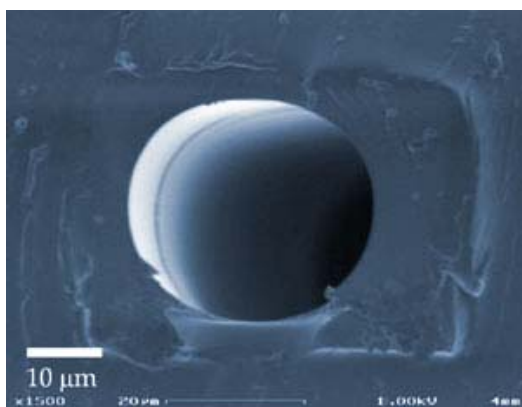


A magazine highlighting the latest applications and technological aspects of research across the chemical sciences.

## Glass-coated microchannels

28 February 2008

Scientists in the US have developed a simple method of coating the channels of microfluidic devices to make them more resistant to chemicals.



David Weitz and colleagues from Harvard University, Cambridge, used a sol-gel method to create a glass coating on polydimethylsiloxane (PDMS) microchannels. PDMS, a type of silicone rubber, is easy to make into microfluidic devices using soft lithography, where the material is 'stamped' with a channel pattern. This makes it ideal for large-scale use.

However, PDMS is not a robust material. It is permeable to liquids and gases, which can affect reactions occurring in the channels. Additionally, organic solvents make the PDMS channels swell, degrading device performance. Glass, on the other hand, is a far more chemically robust material but is much more difficult to make into microfluidic devices.

The glass coating developed by Weitz's group is easily deposited on PDMS channels and acts as a barrier, providing resistance to chemicals and solvents. Weitz said that this method of coating would make device production easier as it 'combines the chemical robustness of glass with the ease of fabrication of PDMS'.

To form the coating, Weitz's group used a sol-gel mixture that begins as a fluid and hardens into a glass. They filled the channels with the mixture, initiated a gelation reaction and then used air to flush out most of the material, leaving a glass coating on the channels. The scientists discovered that the coated channels were resistant to the fluorescent chemical Rhodamine

**"They filled the channels with the mixture, initiated a gelation reaction and then used air to flush out most of the material, leaving a glass coating**

B. After an hour of exposure to the organic solvent **on the channels"** toluene the channels changed very little. By contrast, uncoated channels swelled upon exposure to toluene.

Stephen Haswell, who develops microfluidic devices at the University of Hull, UK, said that although there would be issues with performing reactions at high temperatures, the work represented a step towards merging the advantages of PDMS and glass. 'Lack of chemical resistance is a big problem, and it will be something of a breakthrough to extend the fabrication benefits of PDMS to give more glass-type robustness,' he said.

Weitz's group are working on refining the technique so that the thickness of the coating can be more finely controlled. 'We are also developing extensions to the method which take advantage of the glass coating,' he said.

*Fay Riordan*

### [Link to journal article](#)

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#### **Glass coating for PDMS microfluidic channels by sol-gel methods**

Adam R. Abate, Daeyeon Lee, Thao Do, Christian Holtze and David A. Weitz, *Lab Chip*, 2008

**DOI:** 10.1039/b800001h

### [Also of interest](#)

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#### **Rapid reactions using microfluidic devices**

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#### **Microfluidic devices with heart**

Japanese researchers have harnessed the pumping power of heart cells to make better microfluidic devices.