

Microfluidic devices move from application to fundamental science

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The secrets in a drop of water. Microfluidic devices are used to detect chemicals in small samples for health and security concerns. Now, this imaging technology is being applied to answer fundamental questions.

(Phys.org) —Just a few drops of liquid or a bit more is run past specialized sensors in microfluidic devices to detect chemicals of concern to doctors and security personnel. However, these devices are now being reinvented for use in scientific instruments to answer fundamental questions, according to a review written by scientists at Pacific Northwest National Laboratory and published in *Microfluidics and Nanofluidics*.

"This is one of the first reviews that report how microfluidics enable characterization of liquids," said Dr. Xiao-Ying Yu, PNNL, who led the review. "This is a unique paper in that it gives the perspective needed to understand molecular-level interactions with microfluidics."

From catalysts to [cold medicines](#), molecular-level interactions in liquids are of interest to scientists. [Microfluidic devices](#) allow scientists to obtain [chemical imaging](#) data by channeling small samples past [electron microscopes](#) or spectrometers. The devices hold the sample, and are then fitted into the instrument for analysis. This area of research is quickly growing, and the review included devices that worked at different pressures, including vacuums.

In reviewing recent technical breakthroughs, the team examined the one-of-a-kind microfluidic cell fabricated by Yu and her colleagues. This device, about the size of a large dessert brownie, allows for bimodal analysis or characterization by two different instruments without reconfiguring the device. Recent tests show the device is able to run for hours, providing high-quality images of the changing properties of the liquid surface.

"The device we invented and the review article take advantage of our expertise in microfluidics, imaging, and an understanding of the instruments," said Yu.

More information: Yu, X., Liu, B. and Yang, L. 2013. Imaging Liquids Using Microfluidic Cells. *Microfluidics and Nanofluidics*. Online. [DOI: 10.1007/s10404-013-1199-4](https://doi.org/10.1007/s10404-013-1199-4)

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