Print-and-Peel Method Creates Microfluidic Devices

Typically, researchers create microfluidic devices using the same lithographic techniques and tools used to fabricate computer chips. Lithography is expensive and slow, factors that could limit the ultimate utility of microfluidic devices in clinical applications.

Now, investigators at the University of California, Riverside, and Boston University have developed a versatile non-lithographic method capable of printing relatively simple microfluidic devices quickly and inexpensively using a laser printer as the major piece of equipment.

Valentine Vullev, Ph.D., at UC-Riverside, and Guilford Jones II, Ph.D., at Boston University, led the team that developed the method capable of creating channels, chambers, and other microfluidic components in poly(dimethylsiloxane) (PDMS), a biocompatible material used commonly in microfluidic device construction. The investigators reported their work in the *Journal of the American Chemical Society*.

The investigators use standard computer-aided design software to design the channels, mixing chambers, and detection channels needed for the final device. They then print the design onto polyester transparencies similar to overhead projector sheets that serve as masters to create the actual device.

Though the printed design appears flat, it actually rises off the master, enough so that when PDMS is poured onto the master, cured, and then peeled off the polyester surface, the pattern is reproduced in the resulting thin slab of PDMS. The slab is then placed onto a glass slide, forming the final device.

The investigators found that each master could be used to create five PDMS-based microfluidic devices. Though further research will attempt to increase the number of devices that each master can produce, the investigators note that as it currently stands, their method provides a quick and inexpensive way to test out new microfluidic circuit designs. They also note that their system should be able to create devices readily adaptable for a broad analyzing variety of biological samples.

This work is detailed in a paper titled, “Nonlithographic fabrication of microfluidic devices.” This paper was published online in advance of print publication. An abstract of this paper is available at the journal’s website.

Source: National Cancer Institute