A rapid and low-cost method for benchtop microfabrication of thermoplastic microdevices using UV light and miniaturization

Unmet Need

Microfluidics has shown considerable promise for advancing biomedical research and improving diagnostics. Various methods for fabricating channels for microfluidic devices have been developed. However, the majority of micropatterning techniques are costly, time-consuming, and require access to highly specialized equipment. Therefore, novel methods of micropatterning are needed to facilitate rapid and low-cost fabrication and prototyping of microfluidic devices.

Technology

Innovators at Duke have reported a method for shrink-based micropatterning of thermoplastics using UV light. The benchtop microfabrication method is intended for rapid fabrication and prototyping of lab-on-a-chip (LOC) devices. The technique utilizes UV light and the shrinkage properties of thermoplastics to create a complex multidimensional patterning with micron sized features. The entire microfabrication process can be done within minutes. It eliminates the need of any chemical or medium for pattern formation and transfer and instead utilizes a compact UV pencil lamp and a low-cost oven as equipment. The utility of the method to rapidly fabricate high-resolution microfeatures was demonstrated in the lab on commodity heat-shrinkable polymers.

Advantages

- Rapid and low-cost *in situ* micropatterning on both planar and curved surfaces
- Achieves higher resolution and throughput than existing micropatterning methods
- Eliminates the need for special chemicals or

sophisticated equipment
- The miniaturized micropatterns achieve significantly reduced surface area (up to 95%) and enhanced depth profile. Highly reproducible and scalable.
- Rapidly fabricates complex multidimensional micropatterns on large surfaces
- Creates shrinkable micropatterns with enhanced biocompatibility and stability
- Compatibility with both masked and maskless photopatterning workflows allows easy integration into existing large-scale manufacturing pipelines.

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Publication(s)

External Link(s)

- From the lab of Dr. John Reif
- From inventor Xin Song