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A low-cost manufacturing method for microfluidic device based on soft-lithography technique

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Microfluidics has been widely applied to focus, separate and trap micro sized particles, and has played an increasingly important role for applications that involve single cell biology and the detection and diagnosis of diseases. One essential part of microfluidic applications and research is the fabrication of microfluidic devices. Traditional nanotechnology requires cleanroom and well trained personnel, which has highly increase the cost of microfluidic device fabrication process. Our work demonstrates a low-cost and high resolution method to fabricate microfluidic devices by using soft-lithography technique. Basically, the dry film photoresist is exposed under LED light source and transparent mask is used to pattern microstructures on dry film. Briefly, a layer of dry film resist was first laminated onto a copper plate using a thermal laminator. After ultra-violet (UV) exposure through a transparency photo mask, the exposed dry film was developed, rinsed and dried to obtain the master mold. The microstructures then are replicated into Polydimethylsiloxane (PDMS) to form microfluidic channel for experimental use. This fabrication method enables microfluidic applications in biology, biomedical and medicine area without requiring cleanroom environment.

Biography

Ran Zhou is an Assistant Professor in the Department of Mechanical and Civil Engineering at Purdue University Northwest. Since she joined PNW in Fall 2018, her research interests include microfluidic separation and focusing of microparticles and cells, thermofluids, bioMEMS, microfabrication of biological lab-on-chip system, and acoustic bubble dynamics. Dr. Zhou received her Ph.D. in Mechanical Engineering from Missouri University of Science and Technology (MST, formerly University of Missouri - Rolla) in 2017 honored with the College Dean's Scholar award.

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