World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:9, No:09, 2015

# Microfabrication of Three-Dimensional SU-8 Structures Using Positive SPR Photoresist as a Sacrificial Layer for Integration of Microfluidic Components on Biosensors

**Authors :** Su Yin Chiam, Qing Xin Zhang, Jaehoon Chung

**Abstract :** Complementary metal-oxide-semiconductor (CMOS) integrated circuits (ICs) have obtained increased attention in the biosensor community because CMOS technology provides cost-effective and high-performance signal processing at a mass-production level. In order to supply biological samples and reagents effectively to the sensing elements, there are increasing demands for seamless integration of microfluidic components on the fabricated CMOS wafers by post-processing. Although the PDMS microfluidic channels replicated from separately prepared silicon mold can be typically aligned and bonded onto the CMOS wafers, it remains challenging owing the inherently limited aligning accuracy ( > ± 10 μm) between the two layers. Here we present a new post-processing method to create three-dimensional microfluidic components using two different polarities of photoresists, an epoxy-based negative SU-8 photoresist and positive SPR220-7 photoresist. The positive photoresist serves as a sacrificial layer and the negative photoresist was utilized as a structural material to generate three-dimensional structures. Because both photoresists are patterned using a standard photolithography technology, the dimensions of the structures can be effectively controlled as well as the alignment accuracy, moreover, is dramatically improved (< ± 2 μm) and appropriately can be adopted as an alternative post-processing method. To validate the proposed processing method, we applied this technique to build cell-trapping structures. The SU8 photoresist was mainly used to generate structures and the SPR photoresist was used as a sacrificial layer to generate sub-channel in the SU8, allowing fluid to pass through. The sub-channel generated by etching the sacrificial layer works as a cell-capturing site. The well-controlled dimensions enabled single-cell capturing on each site and high-accuracy alignment made cells trapped exactly on the sensing units of CMOS biosensors.

**Keywords :** SU-8, microfluidic, MEMS, microfabrication
**Conference Title :** ICEE 2015 : International Conference on Electrical Engineering
**Conference Location :** Singapore, Singapore
**Conference Dates :** September 10-11, 2015