# TWO-STEP FABRICATED PDMS BASED CHIP FOR CELLS ISOLATION

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***Abstract*— Three-dimensional (3D) polydimethylsiloxane (PDMS)-based micro-array was fabricated from a SU-8 mold for cells isolation. Cell line human embryonic kidney 293 cells (HEK-293) was cultured on the PDMS micro-array. The cells cultured result shows that cells can be only confined inside the PDMS micro-array.**

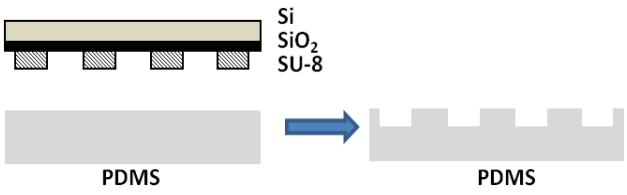
## I. Introduction

Cellular responses to environment stimulus are mostly analyzed by bulk-scale methods, in which process the critical temporal cell signal can be lost. Thus, the analysis of the behavior of a single cell or a small group of cells has high potential on drug and toxicology testing and biology study. Most of the chemical patterning methods are using poly (ethylene glycol) PEG or additional layer to treat the substrate, which complicates the fabrication process.[1-4] In this paper a simple and MEMS standard approach was to develop a biology platform for cell isolation study.

## II. Device Fabrication

3D micro-well structure was fabricated using standard PDMS structure fabrication method. SU-8 micro-pillar structure was employed as the mold to fabricate PDMS micro-wells. As shown in figure 1, first, SU-8 photo-resist (MicroChem, inc.) was patterned on an oxidized silicon wafer to form a reverse micro-well pattern. PDMS mixture (RTV615-A and RTV615-B in a 10:1 ratio) was poured into the SU-8 mold after PDMS degassing process. To solidify the PDMS mixture, the mixture was cured in 45 ℃ for 12 hours. Lower curing temperature can lessen the PDMS shrinkage during PDMS releasing process. Subsequently, the PDMS sheet was peeled off from SU-8 mold in methanol solution. Figure 2 shows the PDMS micro-well bio-chip structure. The size of micro-well size is 50 by 50 μm wide, 40 μm high with 150 μm pitch distance.

Figure 1. Fabrication process of PDMS micro-array.




*Research supported by the Science and Engineering Research Council of Agency for Science, Technology and Research (A-STAR) under Grant 1021710159. The authors thank staffs in the Bioelectronics Lab, Institute of Microelectronics for their generous help and valuable suggestions.

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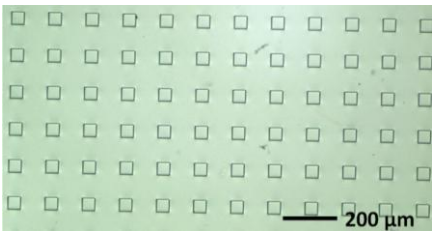
Figure 2. PDMS micro-well bio-chip.

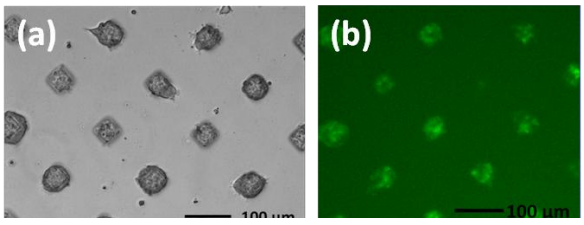



## III. Cell Culture and Conclusion

Bio-chip devices were mounted onto a six-well plate (Grainger Biotech). Subsequently, the bio-chip devices were sterilized by incubating under UV light for 30 minute. The cell line human embryonic kidney 293 cells (HEK-293) were used. 500,000 cells (80% confluency) were loaded on fabricated micro-arraies/wells, which were attached on the bottom of the plate holders. Cells were cultured in an incubator supplied with 5% $CO_2$ at 37 ℃ for two days. For fluorescent microscopy experiments, a stable cell line Zsgreen (Clontech) under the control of a Doxycycline inducible promoter was used. The media was supplemented with 5000 ng/ml of Doxycycline. The bright field microscopy image and fluorescence microscopy image were illustrated in figure 3. Cells are confined in the square well, showing very clear cells boundary.

PDMS micro-array was developed by simply peeling from SU-8 mold. The cells can be confined inside of micro-array from the PDMS surface chemical property change after releasing from SU-8 substrate. This device fabrication method gives a platform for signal sell or small group cell analyses.

Figure 3. Cells culture result on PDMS micro-well structure. (a) Bright-field microscopy, (b) fluorescence microscopy.




## References

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