

MCL826: Introduction to Microfluidics

Laboratory Assignment 2-3

Microfluidic chip fabrication methods

In this lab session you will learn various fabrication methods for making microfluidic chips: (i) xurography with double sided tape (ii) soft lithography using PDMS on silicon wafer and (iii) micro-milling on poly(methyl methacrylate) (PMMA). During the lab session observe various fabrication steps carefully. Thereafter, you will have to use these microfluidic chips to demonstrate the hydrodynamic focusing. You can refer to the the following sources to learn various chip fabrication process:

- Fabrication of microfluidic systems in poly(dimethylsiloxane) (PDMS):
<https://www.youtube.com/watch?v=RxoZhAevZVo>
<http://pubs.acs.org/doi/pdf/10.1021/ac980656z>
- Milling and thermal bonding:
<http://pubs.rsc.org/-/content/articlehtml/2015/lc/c5lc00234f> <http://www.khetarpal.org/thermal-bonding/>
- Introduction to xurography: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1549871>.

In your lab notebook

You are free to take down any notes related to the lab session on your lab notebook. In addition to these notes, you are requested to answer the following questions in your lab notebook. The answers to these can be found from the aforementioned learning material:

1. List the various equipment used in fabrication of PDMS chip. What are the properties which makes PDMS suitable for microfluidic applications?
2. List a few examples of where you can find PDMS in everyday life.
3. What is the smallest feature which we able to make using soft lithography? What are the limitations of soft lithography?
4. What is the difference between a hydrophobic and hydrophilic surface? Is PDMS hydrophobic or hydrophilic?
5. Compare soft lithography, xurography, and micromilling techniques for fabricating microfluidic chips clearly describing their pros and cons.