Lab#6
Microfabrication Principles
Micromolding and Softlithography

1. Check Lab Notebooks and Collect Project Assignments.
2. This lab has two parts, which are 1.Fabrication of mold using SU-8 and 2. Fabrication of microstructures using Softlithography.
3. You will use one polished silicon wafer per batch.
4. Part#1 Fabrication of SU-8 Mold
   i. Remove SU-8 10 from the refrigerator for at least 2 hours before starting the process.
   ii. Start with cleaning process. (Refer lab#1/lab#5 cleaning procedure)
   iii. Bake the silicon wafer at 200^{o}C for 5 minutes.
   iv. Dispense 3 ml SU-8 10 on the wafer (3 inch) after placing the silicon wafer on the spinner.
   v. Spin at (I) 200 rpm, 10 seconds and stop. (II) 1000 rpm, 30 seconds. This spin speed will provide ~ 25 μm thickness.
   vi. Soft bake at 65^{o}C for 3 minutes and 90^{o}C for 7 minutes.
   vii. Place the wafer on 50^{o}C hot plate for 2 minutes and then allow it to cool to room temperature.
   viii. Exposure dose is 230 -250 mJ/cm^{2}. Use the optical power meter to measure the lamp intensity and figure out the exposure time.
   ix. Post Bake (I) 65^{o}C for 1 minute and (II) 95^{o}C for 3 minute.
   x. Develop in SU-8 developer for 4 minutes.
   xi. Clean the SU-8 developer with IPA (avoid acetone.), and then dry with air or nitrogen.
   xii. Hard bake at 150^{o}C for 15 minutes.
5. Part#2 Fabrication of PDMS microstructures using soft lithography.
   i. Add PDMS monomer and curing agent in 10:1 by weight proportion and stir vigorously. We will do 10g base and 1g curing agent.
   ii. Keep the mixture in the vacuum chamber for 30 minutes to remove air bubbles.
   iii. Pour degassed elastomer mixture on a clean and polished silicon wafer.
   iv. Carefully place the wafer in oven at 150^{0}C for 10 min or until PDMS cures.
6. Slowly peel off PDMS microstructure. Measure and compare the height of the PDMS and SU-8 microstructures.