

# PDMS Training (UCSD Integrated Technologies Laboratory (ITL))

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## Prepare Silicon Wafer

1. Obtain Silicon Wafer
2. Clean: a. Spin clean, put in Chuckle, turn on Vacuum, red button for power
  1. set speed to 4000rpm, use foot to control start/stop
  2. Acetone, spray, cotton-stick to wipe
  3. Isopropanol, spray, cotton-stick to wipe
  4. Methanol, spray, cotton-stick to wipe
  5. hot plate, 200oC
3. Check reservation (pswd: rabbit12) for HTG aligner. Sign for HTG aligner.
4. Turn UV lamp for HTG aligner (need about 30 min to warm up), under table, also need ignition for 2-3 sec (start button).
5. m PDMS layer, use SU-8 25 as the photo resistant.  $\mu$ For 10-40

## Spin-Coating Silicon Wafer

1. get Alumni Foil, fold and create a hole. Wrap around spin pole to collect waste.
2. Turn on Vacuum, push in Chuckle, test whether spin
3. for 25 um thickness layer, use 2000 rpm
4. 3 steps program: hit *Receipe*, *Step 1*, *Speed*, 500 rpm, *enter*, *Ramp*, 100 rpm/sec, *Step terminate*, 5 sec. *Step 2*, *Speed*, 2000 rpm, *enter*, *Ramp*, 500 rpm/sec, *Step terminate*, 30 sec. *Step 3*, *Speed*, 0 rpm, *enter*, *Ramp*, 500 rpm/sec, *Step terminate*, 0 sec. *Step*, 0, *Enter* to end receipt
5. Turn on gas on the wall next the power button. Push finger and start to see.
6. Get paper towel, pour SU-8, close, start, start, spin up, use filter paper to pick up the wafers.
7. Heat up: for 25 um, 65oC 180 sec; 95oC 420 sec. Cool down on 65oC, don't cool down too fast.

## Align with Mask using Mask Aligner:

1. Clean Mask First, acetone, isopropanol, methanol, kim-wipe to wipe. Dry with air gun.
2. Turn on *vacuum*, *air*, *compress N2* (two valves, one on the wall, one for aligner).
3. *Power*, *Mask* to open Mask aligner, hold Mask with hand, align with top screen to block any channel, push vacuum button in, make sure no leaking sound, Mask should be sucked on the top screen now.
4. Take wafer and put on chuckle, turn *Sub on*, vacuum is on to suck wafer on chuckle. Make sure wafer is low and click on *Mask* to lower Mask.
5. Upper the wafer until close, but not touch. Click *Cycle*, to lay microscope on top and check the alignment. Upper wafer and tighten the touch. Expose for 40 sec (or 30 sec), 800 watts, 16 mV/cm<sup>2</sup>.
6. *Cycle* (some times twice) to expose to UV.
7. Lower wafer, *Mask* to open, *Sub off* to take out wafer.
8. Hand hold the Mask, *Mask Pull off*, take out mask.
9. shut down power, close valves, and record numbers.

## Post-Exposure Bake and Desolve and Measurement of Height

1. For 25 um, bake 65oC, 60 sec, 95oC, 180 sec. turn off, let cool down gradually.
2. Get flask (own glass ware), use SU8 developer, fill glassware, for 25 um, 240 sec develop time, swirl while developing, isopropanol rinse 3 times, air dry.
3. Measure Height, turn on light, right side knob, turn on screen, focus the camera, light left, camera right. *PRGM*, *Scan length*, 500um, *Profile*, ..., *measurement range*, 655KA, *stylus force*, 15ug, <V to lower stylus, hit *Scan* to get the profile.

To correct the baseline, move *REF*, *MEAS* lines to basal area, hit LVL, now move REF line to basal area before pattern area, and move MEAS line to pattern area, Measure, and PT(print).

## **Silanization of Patterned Wafer (Room 1703)**

1. Use Vacuum desitator next to door. Get alumni foil and make a cup.
2. A few drops of silane in the cup and change gloves.
3. Put in samples (wafers).
4. Turn on pump, make sure the two valves are open connecting the desitator (about 30 min).
5. Get silicone elastomer base (SEB) and curing agent (CA). Weight them with ratio 10:1, so 20 g of SEB and 2 g of CA, mix with glass bar for 3 min, should see a lot of bubbles.
6. Cover with alumni foil to room 1703, use 2nd desitator oven. Open the vacuum valve, bubble up, close the vacuum valve and open the air valve, bubble down. Close the air valve and open the vacuum valve. Repeat until all clean.
7. Take silanized wafer in chamber, pour mixed PDMS on top, degas until it is perfect.
8. Put in oven 125oC, for 10 min baking.
9. Use knife to cut the PDMS out.

## **Oxygen Plasma to modify the surface so that the PDMS and slides can adhere**

1. Open Nitrogen and Oxygen valves on the tanks.
2. Turn on Asher and 2 gas valves on the wall.
3. Turn on Vent, first, shut off Vent, turn SOLN on,
4. Wait until Torr to be 0.040 (40 mTorr).
5. Turn on Gas, it should be 200, adjust knob if not.
6. Turn on Power, it should be 30, adjust knob if not.
7. Now turn off *Power*, *Gas*, *SOLN*, turn on *Vent*.
8. Put the glass slides and PDMS in.

9. Turn off Vent, turn on *SOLN, Power, Gas*.
10. Start timer to be 30 sec.
11. Turn off Power, Gas, SOLN, turn on Vent.
12. Take the PDMS and glass slides out, Gently attach the PDMS on top of Glass.
13. Let it stay for overnight. (this is ok to modify, it seems)
14. 3 steps, 1st 500 rpm 5 sec Obtain Silicon Wafer
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