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Photolithography Tips and Tricks

*Note that these tips in no way substitute the SU-8 instruction manual. They are mearly observations of a grad student learning photolithography techniques over the past 2 years. These notes work for me. Depending on your situation and cleanroom conditions they might not work for you.

-Photolithography is an art. Every time it's different. The only way to know how to do it well is experience. The manual is a great start but it is more of a guideline than anything.

-Do not clean the wafers initially if taken straight out of the box. Inspect wafer closely and if there are ANY foreign objects/dust/smudges then clean with acetone and then immediately with isopropyl alcohol (IPA) before the acetone dries off. Dry completely with nitrogen for smooth finish.

- Temperature of the room severely affects the viscosity and thus the spin height when you're pouring the SU-8. +15 degrees difference makes a -25% difference in spin height from experience.

- To reduce bubbles in spin coating pour the SU-8 as close as possible to the surface of the wafer. If this means pouring in a secondary container (we use plastic weigh boats) then do so.

- If your cleanroom isn't so clean you can put a petri dish over the top of the wafer while on the hot plate to keep rogue particles from landing on the surface. Make sure to keep a little part of the dish propped up or over the edge of the hotplate to allow the solvent to escape.

- Skip the 65 degree steps during the prebake and postbake.

- Prebake for 1.5x longer than the manual instructs. The prebake step is only to evaporate most of the solvent out of the Su-8 resin.

- The test for the prebake is to take it off the hotplate for 2 min and allow it to cool to room temp. Lightly tap the surface of the SU-8 with your wafer holders or tweezers. If it doesn't feel sticky or make a dent then it should be done.

- DO NOT THERMALLY SHOCK THE WAFER/SU-8. Let it cool to room temp before, after, and between hotplate steps.

- If possible continuously agitate when developing. This process is limited by diffusion without agitation. Be careful if using sonicators (we don't use them), they can delaminate small features easily.

- Postbake and develop 1.5x the suggested amount of time. Development can usually go much longer without affecting the patterns too much. The only side effect from development too long is a small bumpy surface profile. Development time should be carefully monitored with spincoats below 10 microns however.

- You should see a pattern immediately after exposure 150+ microns, and after a few min on the hot plate for patterns <150 microns.

-After the final step if you notice small cracks in the Su-8 (usually near edges and corners), put on the hotplate @ 150 degrees C for 10 min.

- After developing, clean with Acetone and then IPA immediately after, then dry with N2. If whitish residue (partially dissolved SU-8) is present, either stick back into developer for longer and agitate and/or rinse with Acetone again and repeat this step.

-Make sure you clean and dry the back of the wafer. The developer will dissolve petri dishes and will fuse with the back of wafer.

-Re-using wafers is discouraged. You'll spend more time and money trying to clean them and/or redoing your lithography because of a bad wafer than it would be to just use a new one.

- To obtain heights not possible for your type of SU-8, you can spincoat twice (or more maybe). Simply restart the process after the prebake and spin another layer on top of the original. Be careful though. 2x the spincoating, 2x possible errors.

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