

Heather/Alex/Ron 2002 Photolithography Recipe

Short Story:

1. 3 solvent clean: 5 min. with ultrasound in TCE, acetone, and methanol
2. singe on hotplate, 120 C for 5 min.
3. spin 1813 photoresist at 7000 rpm for 30 sec
4. bake on hotplate, 90 C for 20 min.
5. 15 min. chlorobenzene soak
6. singe on hotplate, 90 C for 5 min.
7. expose on Karl Suss for 3-8 sec.
8. develop using 3:1 DI: Microposit 351 for 50-90 sec.

Longer Story:

1. General note about cleaning your chip: Never let a liquid just evaporate because it will leave a residue on your chip which may be conducting. If the chip is to be dried, blow dry the chip with clean gas (nitrogen, helium). If the chip is going back into another liquid, as during the 3-solvent clean, do not blow dry between solvents.
2. ---
3. Whether or not to use syringe+filter, glass pipet only, or plastic pipet only, seems to be a matter of taste. No one method seems far and away better and using a filter certainly takes more time, although as the resist become thicker (with age) the filters become more useful. There are also two ways in which the resist can be applied: a) put resist on hile chip is stationary and use a 0.5 sec. spin-up or b) use a longer (5 sec,) spin-up and put the photoresist on during the spin-up. The edge bead will be a little thinner if the chip is already spinning when the photoresist gets put on, but if you are doing edge bead removal or the features are not that small, it may not make a difference. Also, putting on lots of photoresist (5-6 drops for a 5 mm square chip) helps minimize edge bead.
4. ---
5. The chlorobenzene soak seems to be the biggest problem with photolithography. Some chlorobenzene bottles work great but others cause the photoresist to crack and will ruin photolithography. There seems to be no rhyme or reason to which bottles will work and which will not. Stay tuned...
6. ---
7. ---
8. Develop about 2/3 of the total time with one beaker of 3:1 mix, and develop the last 1/3 in a second, "fresher", beaker of developer.

Heather/Alex/Ron 2002 Mesa Recipe

1. do photolithography as outlined in photolithography recipe WITHOUT chlorobenzene soak (no undercut necessary)
2. plasma clean, 110 W for 30 sec.
3. use alpha-stepper to get initial measurement of the profile of your chip
4. mesa etch: 240:8:1 H₂O: H₂O₂: H₂SO₄, times vary but etch rate ~ 4-5 nm/s
5. immediately after etch, dump in DI water for 30 sec., blow dry
6. alpha step again and repeat steps 4,5 if necessary
7. wash with acetone 60 sec., rinse in methanol, and blow dry

Heather/Alex/Ron 2002 Ohmics Recipe

1. photolithography as detailed in photolithography recipe
2. plasma clean, 110 W, 30 sec.
3. dip with 3:1 DI: ammonium hydroxide, 5 sec., rinse with DI water for 15 sec.
4. evaporate ohmics: In theory: 5.0 nm Pt, 100.0 nm AuGe, 25.0 nm Pt, 50.0 nm Au; Thicknesses calibrated to Marcus lab e-beam evaporator: 6.25 nm Pt, 106.4 nm AuGe, 31,25 nm Pt, 62.5 nm Au
5. liftoff in acetone with ultrasound if necessary (if you care about your chip a lot, leave in acetone at least 1 hour before resorting to ultrasound)
6. to look at chip "during" liftoff, put some acetone or methanol (either is fine) in a flouroware container and move your chip quickly from the liftoff beaker to the flouroware conatiner and look at your chip under the microscope
7. rinse in methanol and blow dry (make sure the methanol is blown off the surface and not allowed to evaporate)

Heather/Alex/Ron 2002 Gates Recipe

1. Photolithography as detailed in photolithography recipe
2. plasma clean, 110 W for 30 sec.
3. dip in 3:1 DI:ammonium hydroxide for 5 sec.
4. evaporate 25 nm Cr + 150 nm Au
5. liftoff and clean as with ohmics