

# SOP for Making a PDMS Master Using SU-8 Photoresist

22 September 2014

Microchem Corp.  
617.965.5511  
[www.microchem.com](http://www.microchem.com)

## Materials:

SU-8 2, 5, 10, 50, and 100 Negative Photoresist  
SU-8 Developer Solution PGMEA  
P(100), single side polished, Silicon Wafer (test grade)  
Photomask

## Resources:

Photoresist datasheets are provided in the blue binder. Consult these for process details and suggestions.

<http://www.microchem.com/Appl-MEMs-Microfl.htm>

<http://memscyclopedia.org/su8.html>

1. Start the flood source power supply according to the ABM Mask Aligner SOP.
2. Pour the desired SU-8 into a new syringe dispenser (about 5 mL more than what is necessary) and insert the syringe into the repeating pipetter. (Doing this step earlier in the day will allow for more time for air bubbles to rise.) Alternately, one may simply pour photoresist directly from the bottle to avoid creating bubbles; however this method creates additional mess in the spin coater, which **MUST** be cleaned up by the user, and consumes more photoresist than using the pipetter would.
3. Remove any dust from a **NEW** wafer(s) with N<sub>2</sub>. (Optional: place the wafer on a hot plate at 150-200°C for about 1 hour to drive off any accumulated moisture.)
4. Turn on the Spin Coater and its associated vacuum pump. Center the wafer on the spin chuck using the provided alignment tool.
  - Refer to the spin coater program chart for the desired film thickness
  - Note the series of SU 8 for the film thickness selected
  - Use program #0 if using unlisted spin parameters
  - **DO NOT** reprogram programs #1 through 9

Press the **Run** button. Select the program number. Press **Start** (only once) to test for centeredness; press **0** for additional tests. Apply photoresist using the repeating pipetter when the wafer is centered.

- Apply 4 mL for a 4 in. wafer
- Apply 5 mL for a 5 in. wafer
- **NOTE:** Using a 50 mL syringe dispenser requires ONE press of the button per application; using a 25 mL syringe requires TWO.

Press **Start** again to begin the spin-coating process. Press **Stop** or **Cancel** to silence the alarm at the end. **Note:** pressing **Stop** will return the spin coater to the beginning of the originally selected program.

5. Transfer the wafer to the programmable hotplate to begin the **Soft Bake** procedure. Refer to the "Baking, Exposure and Development Parameters" chart for the proper bake times and

temperatures based on thickness. **The hotplate should be at room temperature at the beginning of the procedure.**

6. Allow the wafer to cool for 5 min after the **Soft Bake**. It is recommended to crash cool the hot plate at this point for the upcoming post exposure bake. To do this, set a bowl of cold water on the hot plate.
7. Expose the wafer following the ABM Mask Aligner SOP. Refer to the “Baking, Exposure and Development Parameters” chart for the proper exposure times based on thickness.
8. Return the wafer to the programmable hotplate to begin the **Post Exposure Bake (PEB)** procedure. Refer to the “Baking, Exposure and Development Parameters” chart for the proper bake times and temperatures based on thickness. **The hotplate should be at room temperature at the beginning of the procedure.**
9. Allow the wafer(s) to cool for 5 min after the **PEB**.
10. Remove the uncrosslinked SU-8 10 using the PGMEA developer in a glass bowl, with constant agitation. Refer to the “Baking, Exposure and Development Parameters” chart for the proper development times based on thickness. Depending on the film thickness the developer may have to be renewed between wafers.
11. Rinse the developer from the wafer using **IPA only**. If a milky surface appears, dry the wafer with N<sub>2</sub> and return it to the developer bath for an additional time (~30 sec.), then rinse with IPA again.
12. Dry the wafer(s) with N<sub>2</sub>.
13. A final **Hard Bake** is highly recommended to promote ruggedness and adhesion. After examining your results using the Mask Aligner microscope (see ABM SOP), transfer the wafer to a hotplate and bake at 150-200°C for about 1-2 hours (setting 5 on the hotplate in the right hood).