# OmniCoat Processing

**Standard Operating Procedure**

**Faculty Supervisor: Prof. Robert White, Mechanical Engineering (x72210)**
**Written By: Michael Bernstein**
**Safety Office: Peter Nowak x73246 (Just dial this directly on any campus phone.)**
**(617)627-3246 (From off-campus or from a cell phone)**
**Tufts Emergency Medical Services are at x66911.**

**Revised: November 23, 2011**

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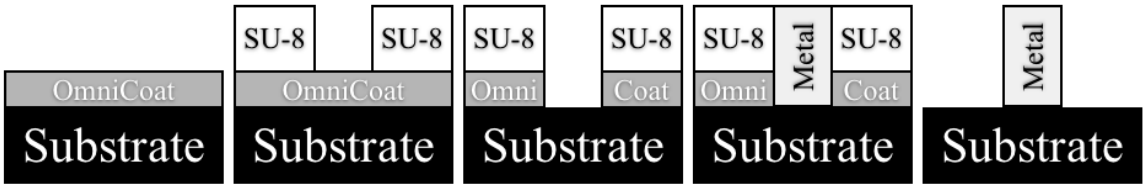
**Goal:**

Deposit a thin film of OmniCoat on a 4" wafer to (1) improve SU-8 adhesion, particularly (2) allow for easier SU-8 photoresist stripping. OmniCoat can be dissolved away as a sacrificial layer in alkaline developers such as TMAH based MFCD26 to lift off the SU-8 after SU-8 processing.




***One possible use of Omnicoat – to remove an SU8 mold that was used to plate thick metal. Note you would need to follow the SU8 lithography SOP, $O_2$ plasma etch SOP (to remove omnicoat in step 3 of the above diagram … a 30 second, 300 mT, 100 W $O_2$ plasma should be sufficient ) and metal plating SOP in order to complete this full process. Note that the substrate would need a seed layer for plating underneath the omnicoat. The current SOP describes the first step (spin on and bake Omnicoat) and last step (Omnicoat strip/SU8 liftoff).***

**1. Material Requirements:**

**1.1** Equipment and tools: Spin processor, hotplates, aluminum foil, cleanroom wipes, OmniCoat tweezers, glass Petri dish, two glass 1000 mL beakers.

**1.2** Chemicals: OmniCoat, MF CD 26 developer

**1.2.1** Hazards associated with chemicals:

**1.2.1.1** OmniCoat contains cyclopentanone (CAS: 120-92-3), propylene glycol monomethyl ether (107-98-2), proprietary polymers and surfactants

**1.2.1.2** OmniCoat is harmful if inhaled; it should be used under the hood at all times. Avoid skin and eye contact. OmniCoat is harmful if ingested (must induce vomiting if ingested). The product is flammable; avoid ignition sources.

**1.2.1.3** MF CD 26 is an alkaline solution, so inhalation and physical contact should be avoided. Additionally, repeated direct exposure can cause central nervous system damage.

**1.3** Engineering Controls: Conduct procedures in the fume hood. Dispose of chemicals as described at the end of this document.

**1.4** Personal Protective Equipment: Nitrile gloves and eye protection required for all procedures. During MFCD26 processing, also wear trionic overgloves.

**2.0 Procedure:**

***Omnicoat Spin on and Bake***

**2.1** Wafer should be clean prior to starting processing. A Piranha clean (see Piranha clean SOP) is suggested.

**2.2** A hotplate dehydration bake is also suggested at 120º C for 5 minutes, but it is not required.

**2.3** Spin on OmniCoat in the dirty spinner. (See Spinner SOP for instructions on using the spinner.)

*Note: Make sure you line the bowl of the spinner with cleanroom wipes, and the lid with tinfoil. Make every effort to keep OmniCoat from getting onto the bowl, chuck, or any other part of the tool. Clean up carefully after spinning. Dispose of cleanroom wipes in the "solvents and photoresist" trash. Use fab wipes, acetone, and a dummy wafer on the chuck when cleaning.*

**2.3.1** Dispense approx.. 4 mL of OmniCoat for a 4" diameter substrate.

***2.3.2*** Spread at 500 rpm for 5 seconds with an acceleration of 100 R/s, ramp up and spin at 3000 rpm for 30 seconds with a 300 R/s ramp. *Expect 13 nm thickness per layer after baking.*

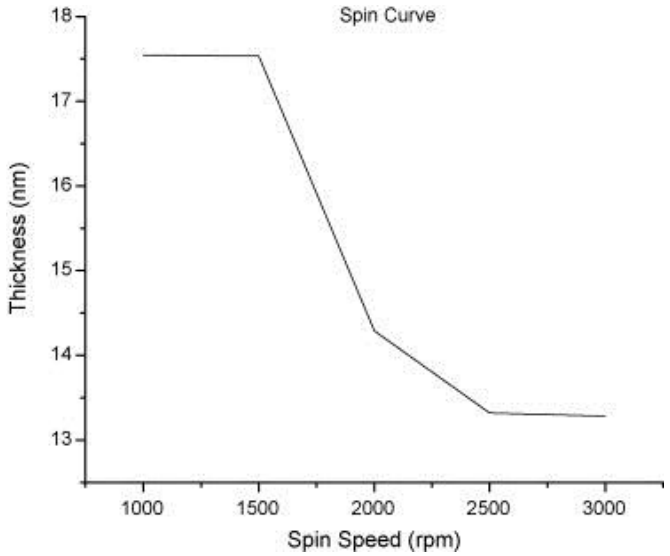



***Figure taken from Pesantez, et al, Sensors and Actuators B: Chemical, June 2008, pp. 426-430.***

**2.4** Remove the wafer from the spinner using dedicated tweezers or with your fingers from the backside. The tweezers will get OmniCoat on them!! Don't use them for anything you don't want OmniCoat on in the future. Try to clean them as best as you can with wipes and MFCD26 after you are finished.

**2.5** Bake (should be conducted with the hotplates in the chemical hood):

**2.5.1** Bake on 200º C hotplate for 1 minute

**2.5.2** Allow wafer to cool to room temperature.

**2.6** MicroChem suggests adding an additional 2 layers of OmniCoat (for a total of 3) by spinning on each layer and baking it individually (repeat steps 2.3 through 2.5 above for each layer).

**2.7** Cleanup:

**2.7.1** Turn off the hotplates. Throw away the tinfoil in the solvent/photoresist trash.

**2.7.2** Remove the hotplates from the hood.

**2.7.3** Make sure the spinner has been cleaned according to the procedures in the Spinner SOP.

***Omnicoat Removal (and SU8 liftoff)***

**2.8** Perform SU-8 processing per the SU-8 Lithography SOP (including coating, exposing, and developing)

***2.9*** To remove the Omnicoat and lift of fthe SU8, place the wafer in a glass petri dish 2/3 full with MF CD 26 developer bath to dissolve the OmniCoat. See undercut rate on the next page; approximately 1 mm/s undercut rate was measured by Pesantez, et al, so 1 minute may be

sufficient to undercut 60 mm structures. However, Microchem recommends a 30 minute release etch to full dissolve the Omnicoat. Some experimentation may be required. *Note: The glass petri dish should be labeled "Omnicoat – MFCD26". Do NOT use the glassware intended for photoresist develop with MFCD26 as this will contaminate the glassware.*

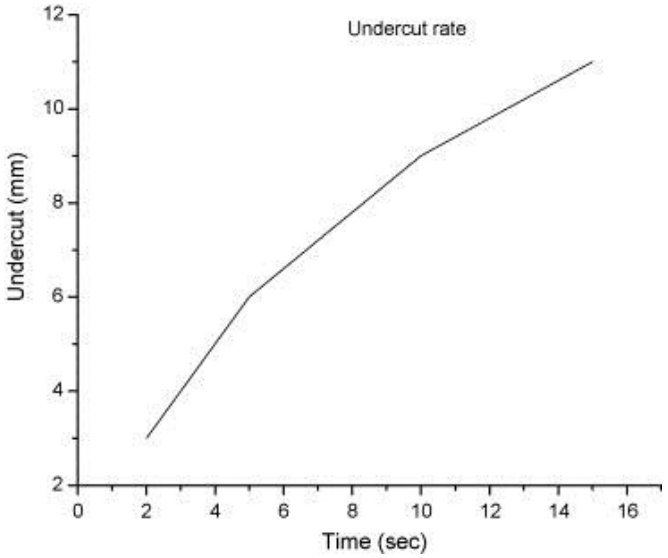



***Figure taken from Pesantez, et al, Sensors and Actuators B: Chemical, June 2008, pp. 426-430.***

**2.10** Fill two 1000 mL beakers with DI water. Rinse wafer for 3 mins in the first rinse, and 3 mins in the second rinse. *Note: The glass beakers should be labeled "Omnicoat – MFCD26 - rinse". Do NOT use the glassware intended for photoresist develop with MFCD26 as this will contaminate the glassware.*

**2.11** Blow dry the wafer.

**2.12** Cleanup:

**2.12.1** Dump used MF CD 26 developer into alkaline waste container. It can be mixed with waste that contains KOH, AZ400K developer, or other alkaline wastes. Rinse the beaker and Petri dish twice with DI water and dump into the alkaline waste. Return to storage.

## 3.0 Storage:

**3.1** OmniCoat should be stored in the photoresist cabinet at room termperature.

**3.2** MF CD 26 developer should be stored in the base cabinet.

## 4.0 Waste Disposal:

**4.1** OmniCoat waste:

**4.1.1** Solid waste should go in the solvent/photoresist trash.

**4.1.2** Liquid waste should go in the solvent/photoresist liquid waste bottle.

**4.2** MF CD 26

**4.2.1** Solid waste should go in the alkaline (base) trash.

**4.2.2** Liquid waste should go into an alkaline waste bottle (HDPE bottle) to be mixed with KOH, AZ400K developer, and other alkaline chemicals

## 5.0 Accident Procedures:

**5.1 Contact:** Read MSDS prior to working with any chemical to familiarize yourself with the symptoms of exposure and recommendations for treatment.

**5.1.1** There are solvent fumes from OmniCoat. If you **breath these fumes**, you may feel dizzy. If this occurs, turn off the hotplates and leave everything in the hood. Leave the room and get some fresh air. If symptoms persist, contact Tufts health services and inform the lab directory and Tufts health and safety office.

**5.1.2** Avoid **skin contact** with OmniCoat and MF CD 26 developer.

**5.1.2.1** If your skin contacts OmniCoat, immediately wash with soap and water for at least 5 minutes. If you experience blistering, redness persists, or have an open wound, seek medical attention by contacting Tufts Emergency Services (x66911).

**5.1.2.2** If your skin contacts MF CD 26, wash skin with water for 15 minutes. If you experience blistering, redness persists, or have an open wound, contact Tufts Emergency Services (x66911).

**5.1.3** Do not **ingest OmniCoat or MFCD26.** If ingested, drink 2-3 cups of water, and seek immediate medical attention (x66911). Lay victim down on side so as to prevent asphyxiation.

**5.2 Spill:**

**5.2.1** If a small, contained spill of MF CD 26 developer or OmniCoat occurs, such as inside the hood, wipe it up with chemical wipes and dispose of in the solvent or base trash container as appropriate/

**5.2.2** If a large spill occurs that you are not comfortable cleaning up, evacuate the lab and contact Tufts emergency services (x66911). Also notify the faculty advisor.

**5.3 Fire:**

**5.3.1** If a fire starts, use the fire extinguisher to put it out. Evacuate the lab and contact the faculty supervisor.

**5.3.2** If you are not able to quickly extinguish the fire using the fire extinguisher, immediately evacuate the lab and call **Tufts Emergency Services at x66911.**

If at any time you feel a situation is dangerous, do not hesitate to call the safety office (x73246, Peter Nowak) or the faculty supervisor (x72210, Robert White).

**Report all accidents (injuries, major spills, fires) to the safety office at x73246 (Peter Nowak) and the faculty supervisor at x72210 (Robert White). For emergencies, call Tufts Emergency Services at x66911.**