**PDS 2010 LABCOTER 2 PROTOCOL – NCF CLEANROOM 026**

This protocol describes the basic operation of the PDS 2010 LABCOATER 2 parylene deposition system. The LABCOATER 2 is located in the cleanroom. The vacuum pump is located in maintenance room 028.

At the start of the day, the tool should be found shut down, under vacuum, with the EMO button engaged (note that the white MAIN POWER button should be illuminated since power is still being applied to the machine). Please check the oil level on the vacuum pump before using the coater.

Please remember to log your runs on the laminated log sheet (important to help track dimer usage).

1. Verify that the vacuum selector is on the **HOLD** position.
2. **Rotate** the EMO button clockwise to release.
3. **Push** the MAIN POWER button (white). Wait for all controllers on the display panel to come on and display current values.
4. **Turn** the FURNACE&CHAMBER GAUGE selector to the **ENABLE** position and **push** the green PROCESS/START button. The temperature will reach setpoint (690 °C) in 45-60min. There is no need to wait for the heater to reach setpoint (the controller will ensure that proper temperature is reached before beginning coating). Proceed with step 5 below.
5. **Turn** the vacuum selector to the **VENT** position. **Wait** for the CHAMBER PRESSURE controller to display >900 and stabilize, indicating that the chamber is at atmospheric pressure.
6. **Remove** the chamber lid by twisting a little before lifting (heavy!). Set the chamber lid on its side (e.g., on the nearby table). As soon as the chamber lid has been removed, **turn** the vacuum switch to the **HOLD** position. Failure to do so will damage the vacuum solenoid.
7. If parylene build-up from previous runs is blistering or separating from the chamber walls, cleaning is necessary. Do not attempt to clean the chamber if the parylene film is thin.

-> Peel off parylene film then spray 2% MicroSoap solution and use cleanroom wipe to remove residues. Take care not to scratch any of the surfaces. When the chamber walls are clean, use a cleanroom wipe to apply an anti-adhesion coat of 2% MicroSoap solution and leave on. This coat should be thin (to dry quickly).

-> Clean the turntable and inlet baffle in a similar manner if a thick parylene layer has been deposited on these surfaces.

-> Ensure that the chamber seal and the base surface where the chamber lid sits are clean. Remove parylene residues from the seal using tweezers. Take care not to damage the seal.

1. **Load** samples onto turntable: distribute the samples evenly. Maintain a minimum spacing requirement of ½ inch between samples. Ensure that none of the sample will touch the inlet baffle once rotation starts.
2. **Replace** chamber lid on chamber base.
3. **Build** an Aluminum foil boat using the metallic boat form tube. Use a 5inx11in piece foil with the reflective side facing the tube. The length of the boat should not exceed 7.5 inch. A new boat should be used for every run (do not reuse a boat coated with black residues)
4. **Weigh** the desired amount of dimer on the scale (use a plastic or Teflon spatula to dispense dimer). **Insert** the aluminum foil boat loaded with the dime into the vaporizer (place it only as far into the vaporizer as necessary to close the door. This keeps the dimer as far as possible from the heat generated by the furnace).
5. **Verify** that the seal on the vaporizer door is clean before closing the door. Do not apply any vacuum grease to the door seal (would mix with the dimer during deposition).
6. Make sure that the cold trap is in the cooling hole and **fill** the cold trap with liquid nitrogen (approx. 1 L or until full).
7. **Switch** the vacuum selector to **VACUUM** (the vacuum pump is now turned ON).
8. **Turn** the vaporizer selector to **ENABLE**. This action also enables turntable rotation. The vaporizer temperature will start increasing once the chamber pressure is below base coating pressure (parameter PLA\_1 = 20).
9. During deposition, refill the cold trap with liquid nitrogen as needed.
10. The run is completed when the green PROCESS START/STOP button starts flashing. **Turn** the Vaporizer selector to **DISABLE** and **push** the green PROCESS START/STOP button (the green light will go out).
11. Option A: If this is the last run, **turn** the FURNACE&CHAMBER GAUGE selector to the **DISABLE** position and wait until the temperature drops to 200 °C. Then **turn** the vacuum selector to the **HOLD** and then to the **VENT** position. Wait until the chamber reaches atmospheric pressure.

Option B: If another deposition run is to follow, **push** the green PROCESS START/STOP button again (the green light will come on. This ensures that the FURNACE heater stays on) and **wait** 20min for the vacuum to pull any remaining parylene vapors. Then **turn** the vacuum selector to the **HOLD** position and then to the **VENT** position. Wait until the chamber reaches atmospheric pressure.

1. **Remove** the chamber lid and set it on its side on the nearby table (remember to turn the selector back to the **HOLD** position as soon as the chamber is removed). Wait for 10 min after the chamber has vented might make removing the lid easier.

* Check the chamber lid and seal for peeling or blistering parylene film and remove as needed following the cleaning procedure outlined in step 8.

1. **Unload** samples.
2. Option A: If another deposition run is to follow, **re-position** the chamber lid on the base, leave the VACUUM selector on **HOLD** and allow the vaporizer to cool below 40 °C. Then proceed from Step 8 above.

Option B: If this is the last run, continue with step 22.

1. **Inspect** the chamber base and turntable for any thick, blistering film and remove/peel off. Spray with 2% MicroSoap and clean with a cleanroom wipe. Once residues are removed, apply a thin anti-adhesion layer of 2% MicroSoap using a cleanroom wipe. Leave on.
2. **Check** the small hole in the front of the chamber base (opening to the vacuum gauge) and remove any accumulated film with tweezers.
3. **Re-place** the chamber lid on its base.
4. Carefully **remove** the cold trap and set it into the holder on the side of the tool (poor any remaining liquid N2 in the Dewar flask before setting the cold trap in the holder). Place wipes or a receptacle on the floor under the cold trap to capture condensation.
5. **Wait** for the cold trap to warm up (30min) and carry it to the garment room. Hold over trash can and **scrape** the thick, white parylene flakes off using the black rubber spatula. Clean with a dry white brillo pad, or scotch-brite. Verify that no frost remains on cold trap, return to cleanroom and clean remaining residues with 2% MicroSoap (spray) and cleanroom wipe. Finally, coat the outside of the cold trap with a thin layer of 2% MicroSoap using a cleanroom wipe.
6. **Clean off** any flakes from the cold trap hole using wipes or the dedicated vacuum cleaner. Return the clean cold trap to the clean trap hole.
7. If the vaporizer has cooled off enough, **remove** the used aluminum foil boat and discard. Inspect the door seal for parylene residues and clean with tweezers if needed. Close the vaporizer door.
8. Put the system under vacuum before shut down by **turning** the VACUUM selector to the **VACUUM** position. Once the vacuum reading is below **100**, **turn** the VACUUM selector to the **HOLD** position.
9. **Push** the EMO button (this will power off all controllers) and leave the system.
10. Use dedicated vacuum cleaner to **remove** any flakes from the floor or working area. **Clean off** stains formed by drips from the cold trap onto the floor using IPA and cleanroom wipes.