Usage Policies Notebook for Parylene Coating System

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INRF UCIrvine

Emergency Plan for Parylene Coating System

Standard Operating Procedures for Emergencies

Contact information

Person	Phone number
Lab Manager	Jake Hes, 949-824-8239 (day), 562-522-8328 (alternate)
Director	G.P. Li: 949-824-4194 (day), 949-824-2047 (alternate)
Staff	Mo Kebaili: 949-824-8239 (day), 949-494-5892 (alternate)
Super User	Carlos Ruiz (818) 527-6349 (Anytime, voicemail or text only)

Hazardous chemicals, gases, and conditions

Hazard name	Description of hazard
N_2 (nitrogen) gas	Asphyxiant
High temperature	Burn or ignition source
Electrical Hazards	Electrical shock, ignition source
Lamp Explosion	Mercury Vapors
Fingers could be jammed	DO NOT Take any action during Operation
Radiation Hazards	High energy of UV light from exposure lamp

Emergency shutdown plan #1

In the event of an emergency, when there is very little time, *press the large red emergency shut-off button at the front of the Tool*. This action will shutdown the system, and will stop and turn off the exposure lamp. Leave the facility at once, and contact the lab manager or the staff.

Emergency shutdown plan #2

In the event of an emergency, when there are a few minutes available, place the tool in the stand-by mode. Leave the facility at once, and then contact the staff and the lab manage

Usage Policies for Parylene Coating System

Standard policies for usage

The Parylene Coating System allows the deposition of polymeric organic coating materials, which are polycrystalline, linear in nature, possess useful dielectric and barrier properties per unit thickness, are pinhole-free, and are chemically inert.

Contact information

The INRF staff or the lab manager may be reached at 824-8239 or 824-9831.

Authorized users

Only INRF registered users who have completed the training and passed the certification may use this equipment. Users may only use the portion of the system for which they have been trained.

Training

Users must have received direct training from the staff in order to use this equipment. Users are expected to understand the nature of the system. Training varies slightly, depending on the process to be performed. Contact the staff for details and to arrange for a training session.

Usage logs

Users are required to log all activity in the log sheets provided. All users must log in when they used the Parylene Coating System (date and time), which Parylene type they used, and when they completed their process in the user log sheets. If users notice anything unusual, they should record it in the user log sheets, and add details in the maintenance log sheets. Any maintenance to the system must be logged in the maintenance log sheets (maintenance staff only).

Safety equipment

There is no specific safety equipment for use on this tool, however cleanroom gloves and tweezers should be used when handling and placing substrates inside the chamber.

Standard equipment and materials

The laboratory provides the following: N_2 blow off gun and isopropanol solvent.

Pollution Control

Dispose of the alcohol soaked wipes in a waste container marked for flammable solid waste.

Scheduling

Reservations can be done online, also, the system can be used on a first come, first served usage if no reservation was made.

Other issues

Users should remain physically present in the cleanroom facility during the entire use of the Parylene Coating System.

At no time should a user adjust a pressure regulator on a gas line. Gas control should be “on” or “off” only, using only the valves appropriate. For most gases, this is usually the valve at the cylinder head.

Non-standard use

Users may not modify any hardware on this equipment. For use of non-standard processes, gases or materials, contact the staff or the lab manager.

Usage Notes for Parylene Coating System

Guide for using the Parylene Coating System correctly

Parylene coatings are extremely lightweight, offering excellent barrier properties without adding dimension or significant mass to substrates. Parylene is typically applied in thickness ranging from 500 angstroms to 75 microns.

Parylene coatings are applied via a vapor deposition process. The substrates to be coated are placed in the deposition chamber. The powdered raw material, known as dimer, is placed in the vaporizer at the opposite end of the deposition system. The dimer is heated, causing it to sublimate to a vapor, then heated again to break it into a monomeric vapor. This vapor is then transferred into an ambient temperature chamber where it spontaneously polymerizes onto the substrates, forming the thin Parylene film.

The Parylene coating process is carried out in a closed system under a controlled vacuum, with the deposition chamber remaining at room temperature throughout the process. No solvents, catalysts, or plasticizers are used in the coating process.

Because there is no liquid phase in the deposition process, there are no subsequent meniscuses, pooling, or bridging effects as seen in the application of liquid coatings, thus dielectric properties are never compromised. The molecular growth of Parylene coatings also ensures not only an even, conformal coating at the desired thickness, but because Parylene is formed from a gas, it also penetrates into every crevice, regardless of how seemingly inaccessible. This ensures complete encapsulation of the substrate without blocking small openings.

Equipment:

1. PDS 2010 LABCOTER® 2 vacuum deposition system
2. Scale
3. Metal cylindrical tube

Material needed:

1. Parylene dimer (can be either Parylenes N, C or D),
2. Micro-soap
3. Aluminum foil

Procedure:

1. Spray the chamber, wafer holder and the lid with the micro-soap.
2. Wrap the aluminum foil around the metal cylindrical tube to make a tube shape. Twist one end of the aluminum foil. (Make sure it is secure enough to hold the dimer.)
3. Place the aluminum foil tube on the scale, and zero the scale.
4. Add the Parylene dimer into the tube until the desired weight.
5. Insert the foil tube into the furnace chamber. (Make sure the open-end of the foil tube goes in first.)
6. Place the wafers onto the wafer holder. Then put the wafer holder inside the chamber.
7. Place the lid on to close the chamber.
8. Connect to the liquid nitrogen tank. (Make sure the tank is at least half-full.) Turn on the liquid nitrogen.

9. Turn “Vacuum” to “Vacuum” position.
10. Turn the “Furnace” to “Enable” position.
11. Press the green button to start.
12. The furnace temperature and gauge reading should start to increase.
13. Enable the vaporizer when the furnace temperature reaches 650°C.
14. Make sure to turn on the switch next to the furnace chamber.
15. Use this switch to maintain the vaporizer temperature between 170 ~ 190°C. Alarm will be triggered for temperature higher than 195°C. The furnace temperature and gauge reading should stay at 690°C and 350°C, respectively.
16. The vaporization takes around 1 hour; the exact time may vary depending on the amount of Parylene dimer used.
17. Once the vacuum pressure stabilizes around the set pressure (30), the vaporization is completed.
18. Press the green button to stop the process.
19. Disable the furnace and vaporizer. Make sure the switch is at the off position.
20. Turn the vacuum to “Vent” position.
21. Turn off the liquid nitrogen.
22. Remove the wafer holder from the chamber, and collect the wafers.
23. Make sure to remove the thin layer of Parylene coated on the chamber, the lid, and wafer holder.
24. After cleaning everything, place the wafer holder and lid back.