

# Standard Operating Procedure Hood for O<sub>2</sub> Plasma Cleaner & Spincoater

*Seung Hyun Sung, Martha Hay, March 2014*

## Description of Process

Plasma cleaning can be utilized in preparing a substrate for spin coating or deposition. In this process, plasma is produced and introduced inside an evacuated chamber to clean substrates. P.O.W.E.R. Lab has a Plasma Cleaner located near the spincoating station for this purpose.

Spin coating is an essential technique for thin film device fabrication. Users can program the Spin Coater conditions (ex. spin speed, time) to achieve a desired film thickness. It is important to note that solution concentration, solvent characteristics, and substrate type and cleanliness have significant impacts on film thickness and quality as well as coating conditions.

## Personal Protective Equipment

*EYE PROTECTION:* Safety glasses or goggles

*PROTECTIVE CLOTHING:* Laboratory coat and gloves (nitrile)

## General Note:

The hood sash should be kept at the minimum working distance at all times.

## O<sub>2</sub> Plasma Cleaner Operating Procedure

- Purpose: cleaning of substrates
- Refer to Figure 1 for Plasma Cleaner Schematic
- Start-up Procedure:
  - Place substrates holder on substrate shelf inside the plasma cleaner
  - Ensure that the valve on the door is closer
    - The Swagelok valve controls a ball bearing; rotate the Swagelok so that the ball valve is closed (the ball is visible).
  - Hold door to opening and turn on vacuum pump.
    - Note: Hit the “Pump Power Switch” on the pump itself. Not the “Pump On” button of the plasma cleaner
  - Turn plasma cleaner power on.
  - At this point the door should be held in place when you let go of it.
  - Turn the RF Level from Off → Low → Med → High, pausing several seconds between each switch
- Shut-down Procedure (reverse order of Start-up):
  - Turn the RF Level from High → Med → Low → Off, pausing several seconds between each switch
  - Turn the Plasma cleaner Power button off
  - Turn the Vacuum pump power off
    - Note: Hit the “Pump Power Switch” on the pump itself. Not the “Pump On” button of the plasma cleaner

- \*Slowly\* open the Swagelok valve until you hear a hissing, at this point let the chamber refill to atmospheric pressure until the door comes loose (you should be holding it to ensure it does not drop).
- Remove substrates from substrate shelf

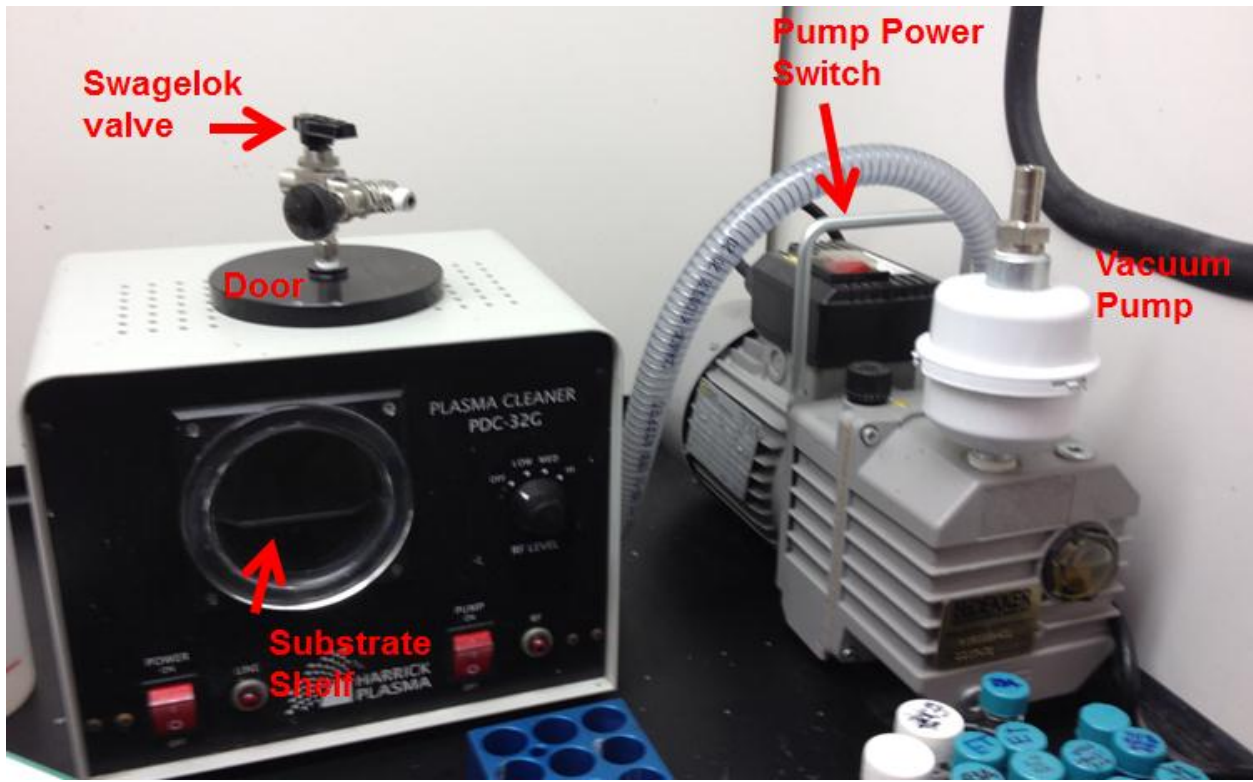


Figure 1. Schematic for O<sub>2</sub> Plasma Cleaner

### Spincoater Operating Procedure

- Purpose: application of a thin layer of solution to be turned into a thin film
- Refer to Figure 2 for schematic of spincoater
- Start-up Procedure:
  - Ensure that the tubing on the pump is correctly positioned and connected to the spincoater.
    - Note: one valve should be connected to tubing, while the other has no connections
  - Turn the vacuum pump on (switch is located on back of the pump)
  - Open the compressed nitrogen tank by rotating the top silver valve, slightly, following the direction arrows on the valve.
  - On the spincoater control panel:
    - “Select Process” → highlight the desired process and hit “Edit Mode”
    - Ensure that acceleration, speed, and hold time are set to the conditions of interest
    - Use page up and page down buttons to switch between fields, use up, down, left, right arrows to adjust values within these fields
    - When settings are verified select “Run Mode”
  - Open the spincoater lid
  - Place and center your substrate on the spincoater chuck
  - Press vacuum button on the control panel
  - The control panel display should read a minimum of 15 next to vacuum

- If you do not get a reading of at least 15, the spincoater will not allow you to proceed to operation
    - Try disassembling the chuck and cleaning the O-ring with solvent (e.g. methanol) to get a better seal
  - Apply solution to the top face of your substrate (fixed in place by vacuum)
  - Close spincoater lid
    - Note: opening and closing the spincoater lid should be done slowly so as to not disturb the solution on top of the substrate
  - Control panel should read “Ready”
    - If monitor reads “need vacuum” you do not have a good seal and should check the spincoater chuck (try cleaning again)
    - If monitor reads “need CDA” check the pump and/or compressed nitrogen connections
  - Hit “Start”
  - Once your program has finished running, open the spincoater lid, hit vacuum to release vacuum, and remove substrate carefully with tweezers from chuck
- Shut-down Procedure:
  - Turn vacuum pump switch off
  - Close compressed nitrogen valve

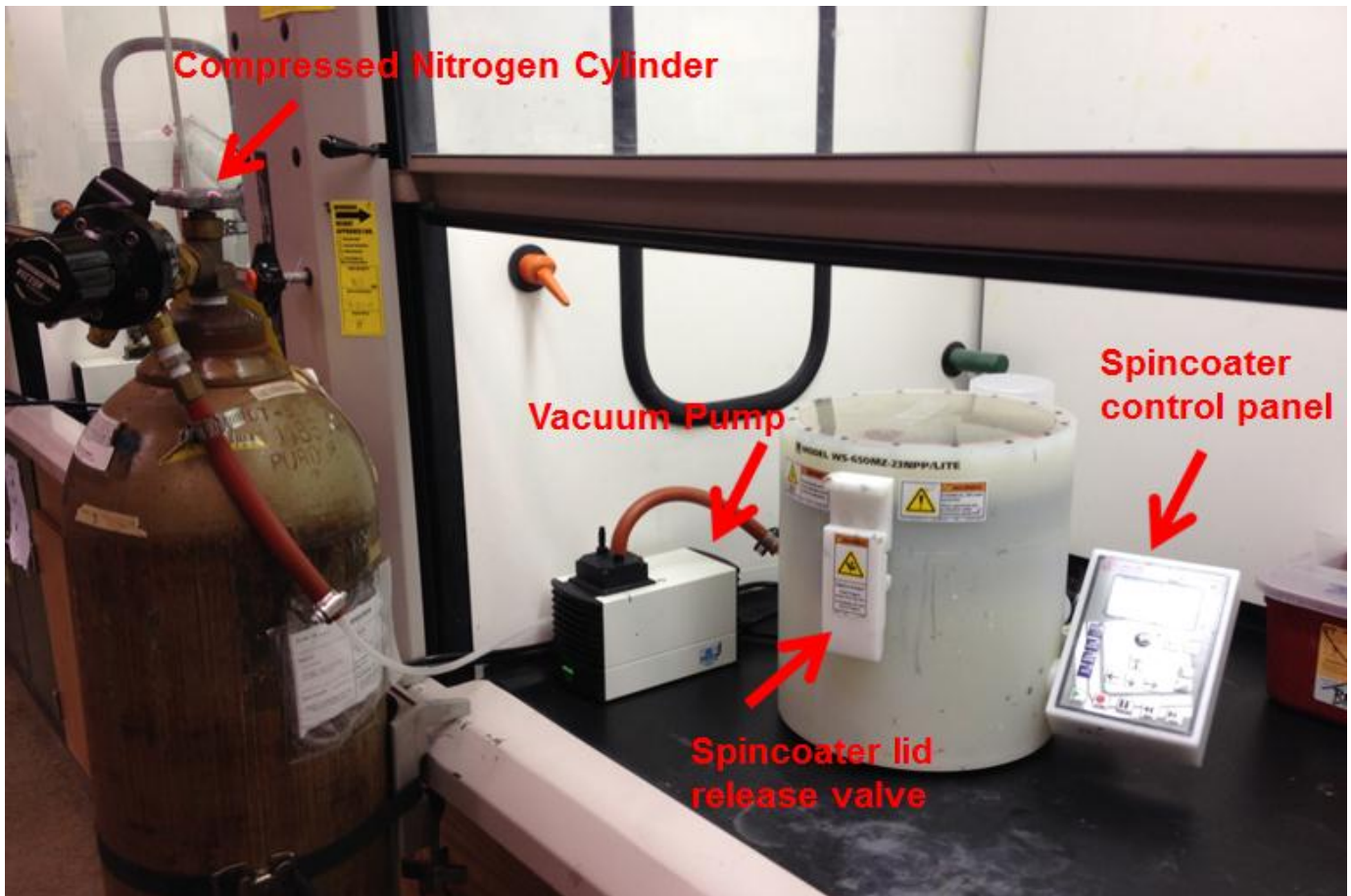


Figure 2. Schematic for Spincoater