Standard Operating Procedure (SOP)

Lesker PVD75 Magnetron Sputterer

(PVD-03)

In case of fire or injury please call 911 (511 from campus phones)

If there is an error on the system/tool please report it on NEMO, the staff will take care of it

Please *DO NOT* run diagnosis without a staff member's approval

Common errors and how to fix them

Power not on: Power and voltage at zero. You most likely forgot to log in. Abort the recipe, log in via NEMO, and run the recipe again. If this does not help, please contact staff.

Not able to maintain plasma: Low power and high voltage (800 V), along with a very dim plasma, indicates that the process pressure is too low to maintain the plasma. Increase the pressure to 10 mTorr, watch the power reach the setpoint, and bring the pressure back down to a value slightly higher than your initial value.

Substrate ID clearing when loading sample: Kapton tape can on occasion cause the substrate ID clearing. Make sure that the wafer sensor in the load lock is not obstructed by the tape.

High pressure in the process chamber (PC): This is likely due to the gate valve being closed due to an aborted recipe. Run "PC Pump" and wait for the pressure reaching < 5e-6 Torr.

Lesker PVD75 Magnetron Sputterer

Procedure Overview

0) Before you begin
1) Mount the sample to the platen
2) Vent the load lock
3) Load sample(s) into the load lock
4) Pump the load lock and load sample into chamber
5) Run deposition recipe
6) Unload sample to load lock and vent load lock
7) Unload sample from load lock
8) Pump down load lock
9) Log out of NEMO

Info & policies

Location: QNF, Bay 2

Tool owner: Daniel Sabrsula (dsabr@seas.upenn.edu)

Tool training: 1-hour in-person training

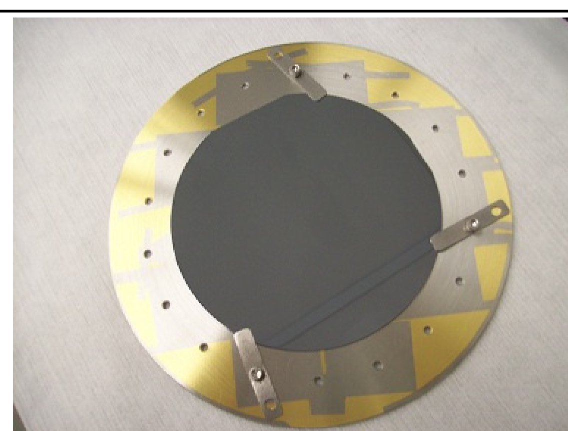
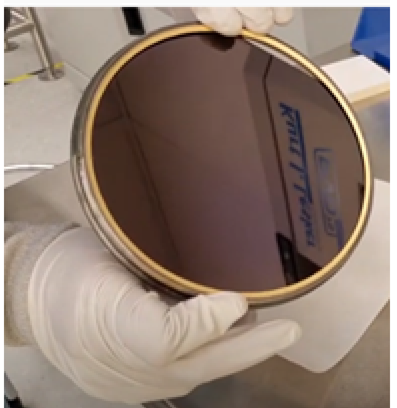
Tool Overview:

The Kurt J. Lesker PVD75 Magnetron Sputterer is a sputtering tool used for depositing metals and oxides under high vacuum ($< 5 \times 10^{-6}$ Torr). The tool houses an automated load lock which makes transfer of samples quick and easy of samples up to 6” in diameter. The tool contains a heated stage that can be heated up to 550℃.

The tool can house four deposition targets at a time, with three DC cathodes and one RF cathode. The tool can operate using two process gasses, namely Ar and O2 (and a combination thereof). The tool can be used for co- and sequential depositions. Targets rotate twice a week and can be requested via the “target request form” which can be found on the QNF wiki or by following the QR code below:

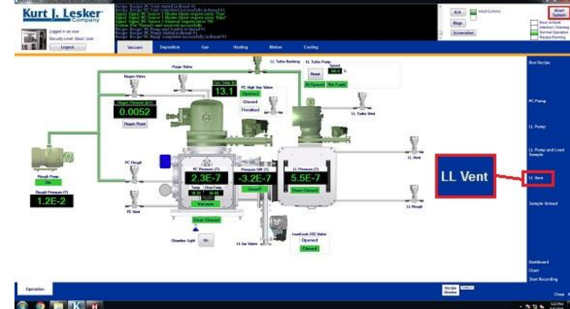
Target request form

Full procedure:

0. Before you begin **0.1.** Log in via NEMO **0.2.** Ensure that you're logged into the Lesker software as a basic user. **Username:** user **Password:** user	
1. Mount the sample to the platen **1.1.** Place your sample on the platen. Fasten the sample with either kapton tape or the metal clips. **WARNING!!:** Screw tips MUST NOT stick out of the back-side of the chuck. Doing so will cause the chuck to be stuck in the process chamber. **1.2.** If your sample is a 6" wafer, then remove the platen and place your sample directly into the sample ring (upside down). **1.3.** Flip the platen upside down. Your sample should be facing downwards going into the load lock transfer arm.	 

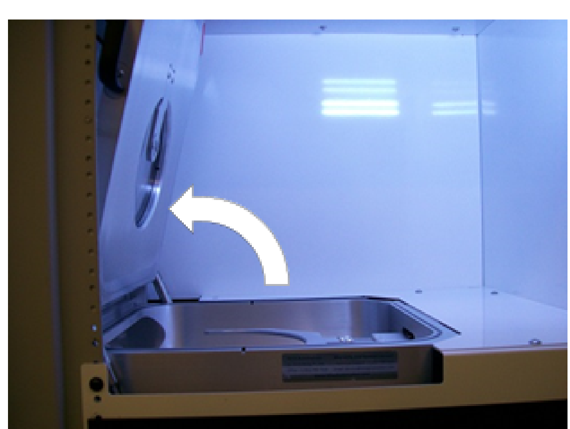
2. Vent the load lock chamber

2.1. Press “LL Vent” to run the venting recipe. This should only take a few minutes.

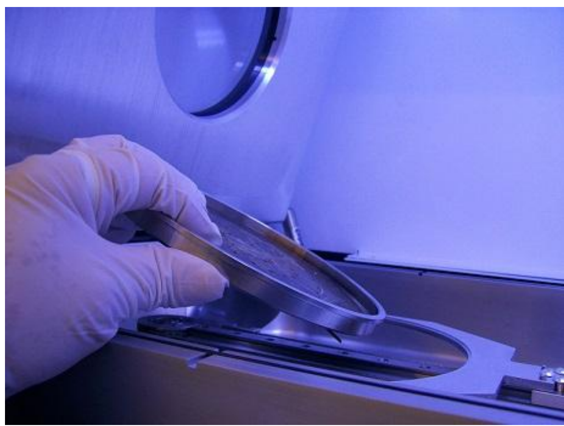


3. Load sample(s) into the loadlock:

3.1. Open the panel door that the computer is mounted on, open load lock lid.

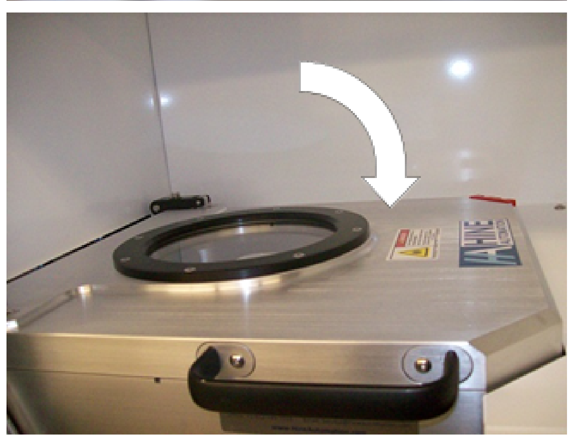


3.2. Place the sample into the load lock. Ensure that the sample is face-down.



3.3. Close the load lock lid and the panel door.

Note: If you forget to close the load lock door, the software will let you know when you run the pump-down recipe.

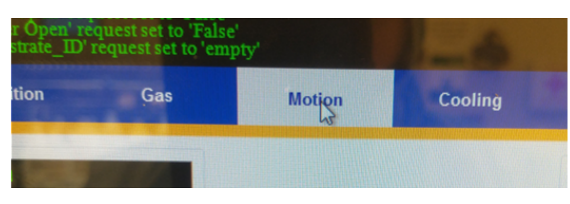


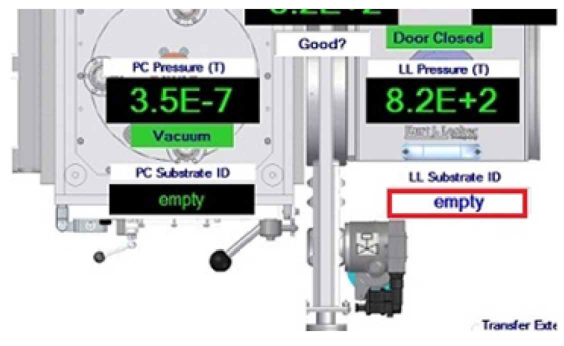
4. Pump the load lock and load sample into chamber

4.1. Press the "LL Pump & Load Sample" button.

4.2. Wait for the recipe monitor to pause.

4.3. Press the "Motion" tab, and enter your substrate ID. Press enter. You'll hear a sound and the software will inform you that the ID has been changed.





4.4. Press the "resume" button on the recipe monitor.

4.5. The tool will now pump down the load lock and transfer your sample into the tool.

4.6. Once the recipe is complete, check the "Motion" tab. Your ID should now show up inside the process chamber and is no longer visible in the field where it was entered.

Note: This process should take 3-4 minutes.

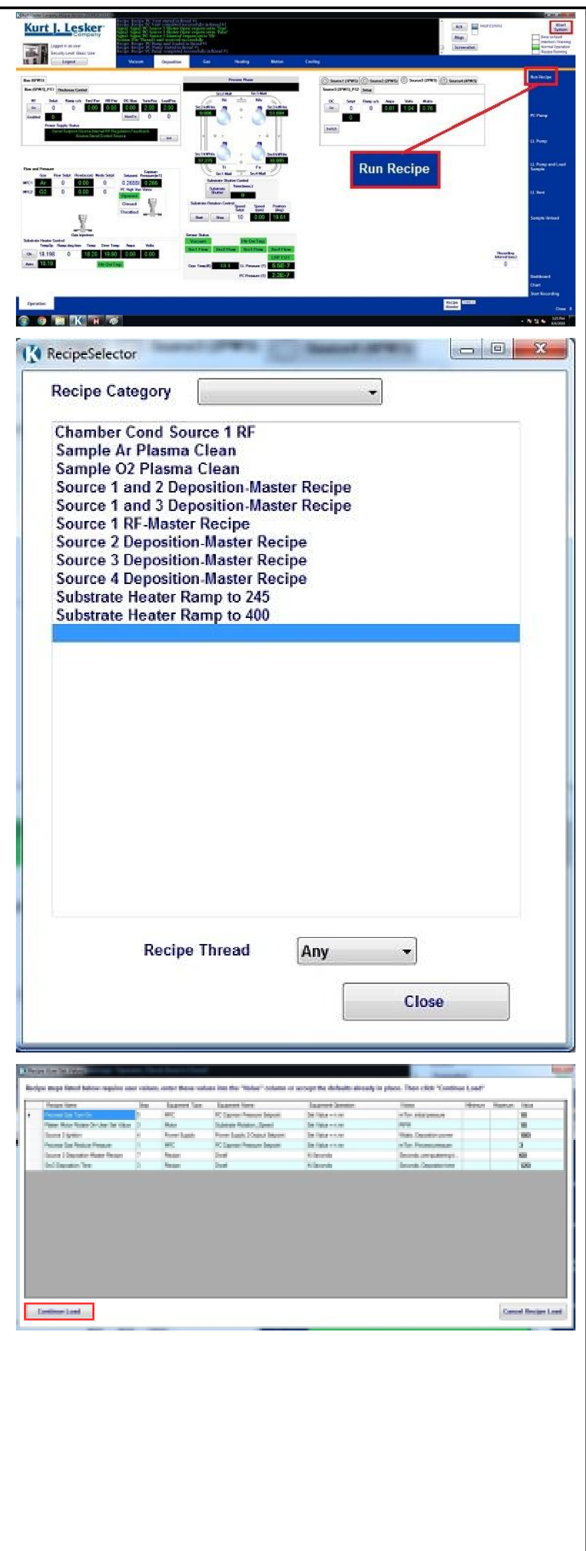
5. Run deposition recipe

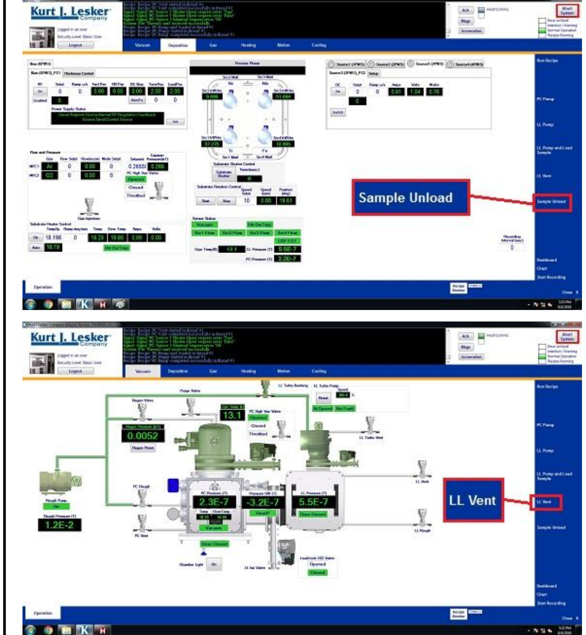
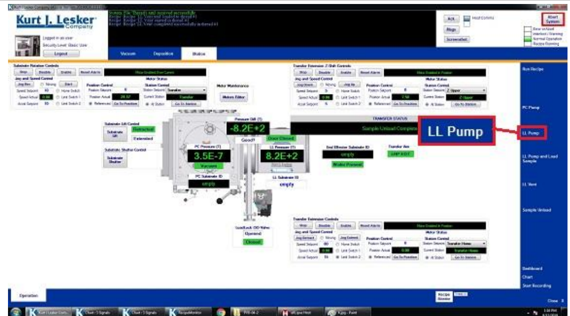
5.1. Press the "Run Recipe" button.

5.2. Pick the recipe you wish to run. There are dedicated recipes for sources 1 to 4, along with co- and sequential depositions for sources 2 to 4.

5.3. Enter process parameters and click "Continue Load". An estimate of the deposition rate for the default deposition settings are shown in the final row in the recipes. If the process parameters are changed from the default, the deposition rate will also change.

5.4. As the recipe is running, closely monitor the deposition power and voltage. Ensure that the deposition power is at the actual setpoint and that the voltage is not peaking at 800 V. If this is not the case, please refer to the front page of this SOP.



 6. Unload sample to load lock and vent load lock **6.1.** When the deposition recipe is complete, click the “Unload Sample” button. **6.2.** Press the “LL Vent” button to vent the load lock chamber. Wait for the recipe to finish	
7. Unload sample from load lock **7.1.** When the recipe is complete, open the load lock door, remove your sample, and place it back into the chuck on the table. **7.2.** Flip platen right-side up. **7.3.** Remove sample from the platen. **7.4.** Close the load lock door.	
8. Pump load lock **8.1.** Click “LL Pump” to pump down the load lock. **8.2.** Once the recipe is complete, the software will clear the ID you entered in the “Motion” tab.	
9. Log out of NEMO **9.1.** Log out of PVD-3 on NEMO	

Feel free to contact the staff members with any questions about your process and the tool.

Last modified: 4/29/2024 by Dan Sabrsula