

MRC SPUTTERING SYSTEM OPERATING PROCEDURE

- A. Quick Check**
- B. Chamber Vent**
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- D. Wafer Processing using Recipes**
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RF Sputtering
 - II. Tuning (See Scott McNamara)**
- E. Manual Regen Procedure**
(See Rich or Scott for Approval)

MRC SPUTTERING SYSTEM OPERATING PROCEDURE

The MRC is currently configured for DC & RF magnetron sputtering with RF etch capabilities.

A. QUICK CHECK (See Figure 1 & 2 Below)

1. Check that there is House Nitrogen to vent chamber.
2. Check that temperature on the CryoPump temperature monitor is ~13K. (See Figure 4)
3. Check that all the interlocks on the 8X Service Screen are Red. STS OK, Chamber Vacuum OK, Cooling Water not in Error, Safety Cover Ok, Air Pressure OK (80 psi CDA), Chamber Closed (See Figure 1)
4. Check that the key switch is on Enable.
5. Make sure Shutter is open to heater position. This means Target H is flashing on the LED Screen.
6. The rough pump for the PE2400 and the MRC sputtering systems is now turned on/off from a control box on the PE2400. When you want to rough a system turn it on from this box. When you are through roughing, turn it OFF!!. (Figure 2)
7. The MRC/Perkin Elmer Rough Valve Switch is up and on MRC Position

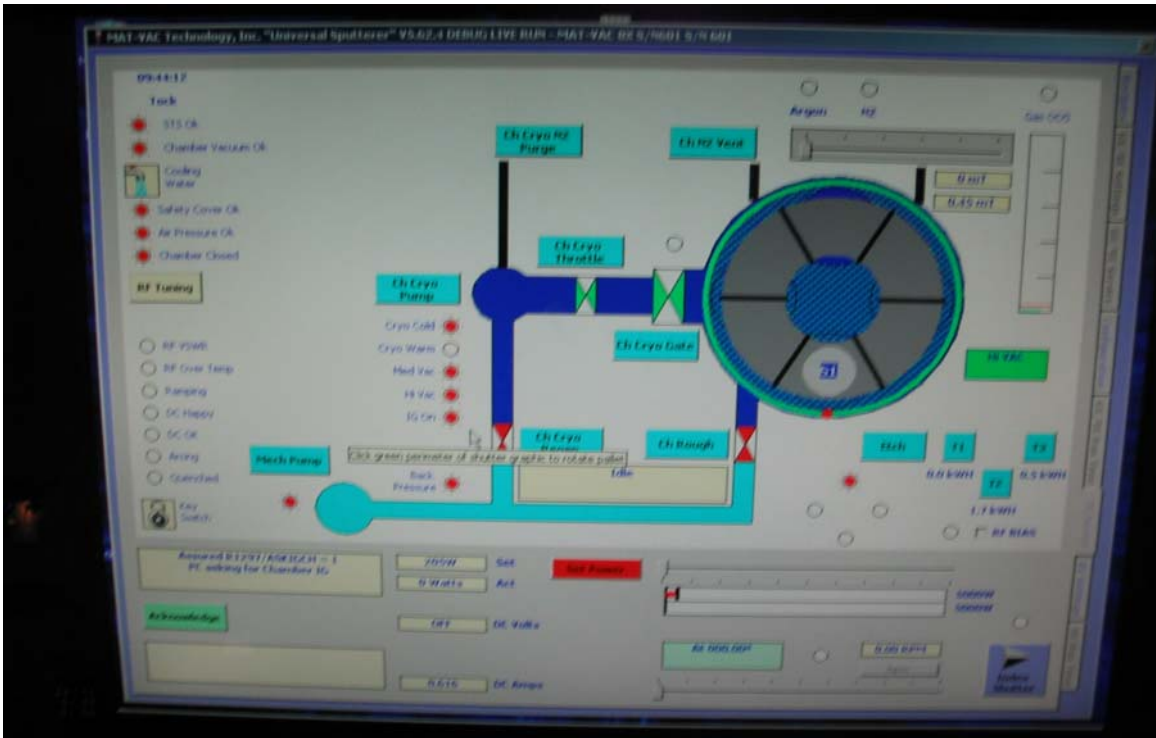


Figure 1 MRC Standby Mode



Figure 2 Rough Pump Switch



Figure 3 Rough Valve Switch

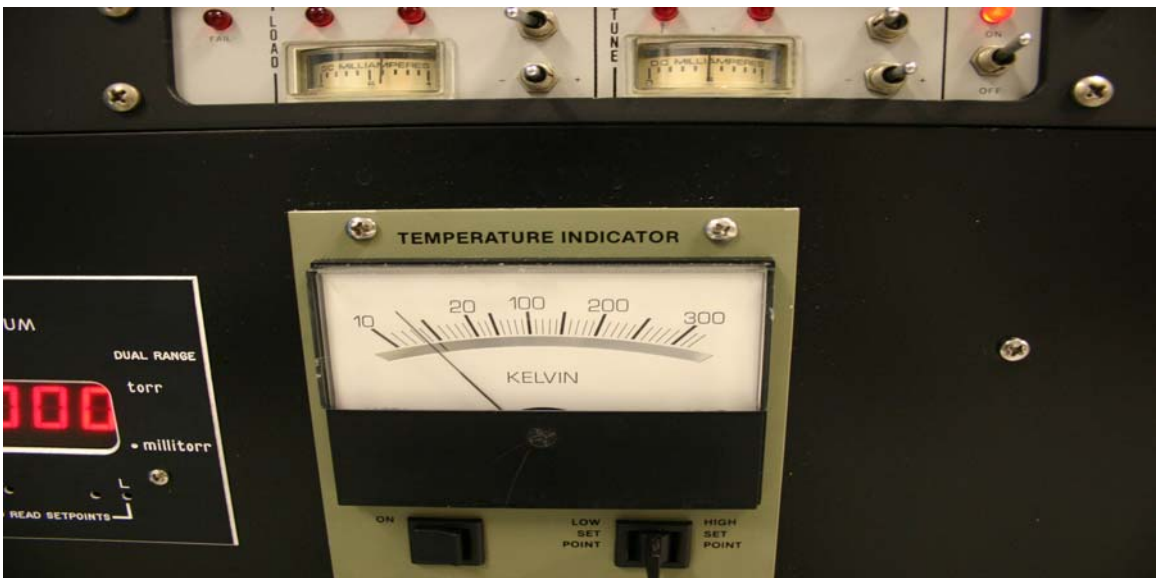


Figure 4 Cryopump Temperature Indicator

B. CHAMBER VENT: -

1. Again check that there is Nitrogen Pressure.
2. Check Base Pressure by Double Clicking Ion Gauge. If MRC has been pumping for an hour it should be 3.0×10^{-6} Torr.
3. Shut-Off Ion Gauge & Close Ch Cryo Gate Valve. Gate Valve will turn Red.
4. Click on Ch N2 Vent. Bar will turn yellow when venting Nitrogen and will turn black again when Nitrogen Vent Valve is closed.
5. Press **HOIST UP**: Two switches simultaneously to open up the chamber. These switches are located on the LED Sputtering Maintenance Screen. If chamber does not come up fully press **HOIST DOWN** then come back up.
6. Please Note the Cooling Water will display in Error until the Auto Pump is performed.

C. WAFER LOAD and PUMP-DOWN: -

1. Clean O-ring for Chamber and mating surface. Use only IPA, Never Acetone!!
2. Load wafers into chamber.
3. Press **HOIST DOWN** two switches simultaneously to close the chamber. Make sure you come completely down so the chamber seals properly.
Make sure the MRC/Perkin Elmer Rough Pump is on. (See Figure 2) and the Rough Pump Valve is in the Up Position (See Figure 3)
4. Press The GTG button and the Begin Button on the LED Sputtering Maintenance Screen simultaneously. Only release when you hear the Rough Valve open.
5. When the reading on the **Granville Phillips 307 Controller A** reads 6.9×10^{-2} Torr or 69 mTorr the Ch Rough valve (See Figure 5) the rough valve should close (turn Red) and the Gate Valve should Open (Turn Green). The cross over time should be about 2 mins.
6. Double click on the IG On (Ion Gauge). The system should pump down to $\sim 3 \times 10^{-6}$ T in approximately 1 hour.
7. When base pressure is achieved, Record the base Pressure for your run then Shut-Off the Ion Gauge.
8. When finished with the MRC System, Please switch the Rough Valve to Perkin Elmer and shut off Rough Pump. (Make sure no one is using the Perkin Elmer before shutting down Rough Pump.



Figure 5 Cross-Over Pressure

D. WAFER PROCESSING

The system can be set-up to carry out one of the following procedures or any combination of these procedures as desired.

I METAL DEPOSITION

1. Make sure you Open Shutter to a Target that is under the Heater Position. You can tell by checking the LED Screen which will flash under the H Position or the 8X Service Screen which will show shutter blue high lighted under the far back target.
2. Log your Base Pressure by turning on IG On (Ion Gauge On) on 8X Service Screen. Then Shut Off Ion Gauge. (See Figure 6)
3. Click on 8X Settings. You are now going to create a recipe for your process. Click and select the Target you would like to Sputtering. Normally Target 1 (Chromium) & Target 2 are set up for DC and Target 3 (Gold) is set-up for RF Sputtering. You can tell if the Target is set up for DC or RF by the Max Wattage 5000 Watts for DC and 1250 Watts for RF.
4. Move the arrow bar to the correct Wattage you desire for your target. Caution!!! If you try to enter the Wattage by keying in a number the recipe will only use the value that was set by the arrow bar.
5. Click on the Gas Argon Std or N2 which is actually Oxygen. Set the slider to the desired mTorr Pressure. For example 13 mTorr. Use the arrow keys to fine tune after using the mouse.
6. Set the rotation speed in RPM's Similar to the old MRC. The table will not rotate during Pre-sputter.
7. Set the time for Sputtering and Pre-sputtering by clicking on the slider or highlighting the actual time and typing number.

8. To add a step for example Pre-sputter click on the Pre-Sputter Box, follow Steps 3-6 and click add this step to the recipe.
9. To add Sputter step click off Pre-Sputter and click on Add this Step to recipe.
10. If you want to Sputter Etch Click on the white part that Surrounds the 3 Targets on the Upper Left corner of the screen. (See Figure 2). Make sure you don't use a value higher than 300 Watts for our MRC. Table will not rotate during this step even if you set a value.
11. The last step on everyone's recipe should be a pause step. This is required to make sure everyone lets the targets cool down sufficiently and they don't oxidize if you vent too quickly. To create a pause step please move the arrow bar next to the Pause Button, normally 10 minutes, then hit the pause button which will add it to your recipe.
12. Please note we don't use the Wait for HighVac Button or Vent & Stop Button, as you must be present thru the entire Sputtering Process.
13. After you complete you're Recipe, go to the Recipes Tab on the Right of the 8X Screen. Click on Save Current Recipe Button and save it under the current ones. At present you can only save in the general directory that everyone shares.
14. Finally you should hit the Cook Button which has a lightning symbol, which will run the last recipe entered on the 8X Settings Screen or the current recipe saved. My advice is to always hit the Load Selected Recipe pick your recipe, then check it on the 8X Settings Screen to make sure it's correct then hit the Cook Button.
15. When the recipe runs it should abort if there are any problems creating a Plasma. During the Automatic Sputtering Process the 8X Service screen will display your recipe and the times. If however you see arching

and need to shut off the process please click the EMO Button with the mouse on the Bottom Right of the screen. This will automatically close the Gate Valve. Please call me Scott at Ext 7728 if your recipe aborts automatically or manually by users.

- When the recipe is complete it will pause for the period that you entered into to the system and you cannot update or use the computer during the Pause.

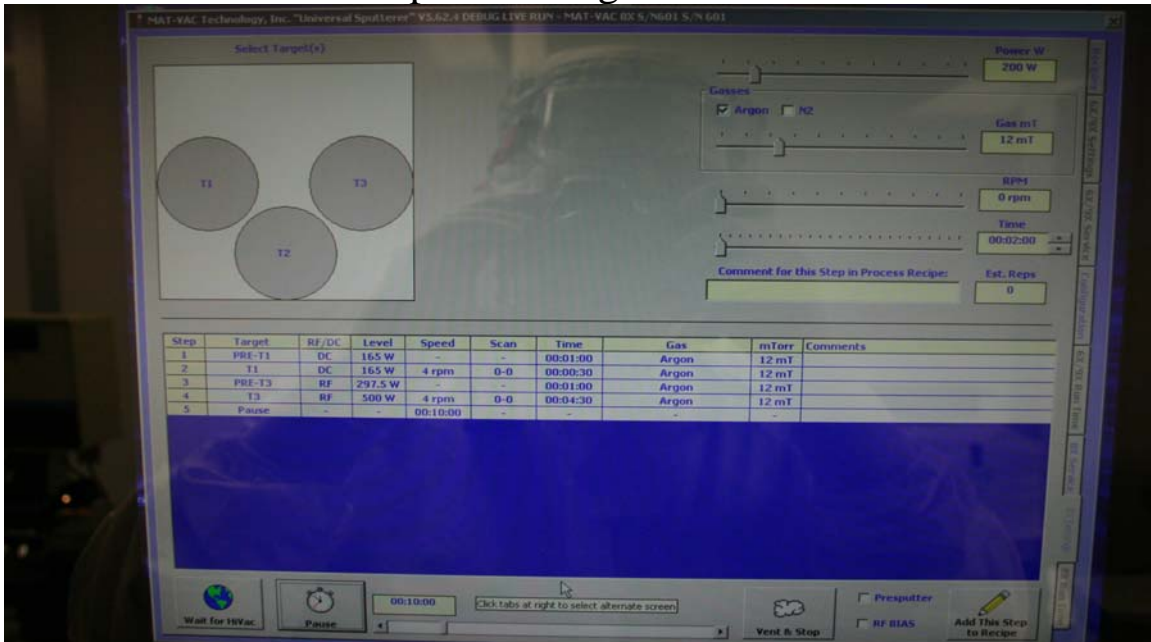


Figure 6 (8X Setting Screen) Typical Recipe