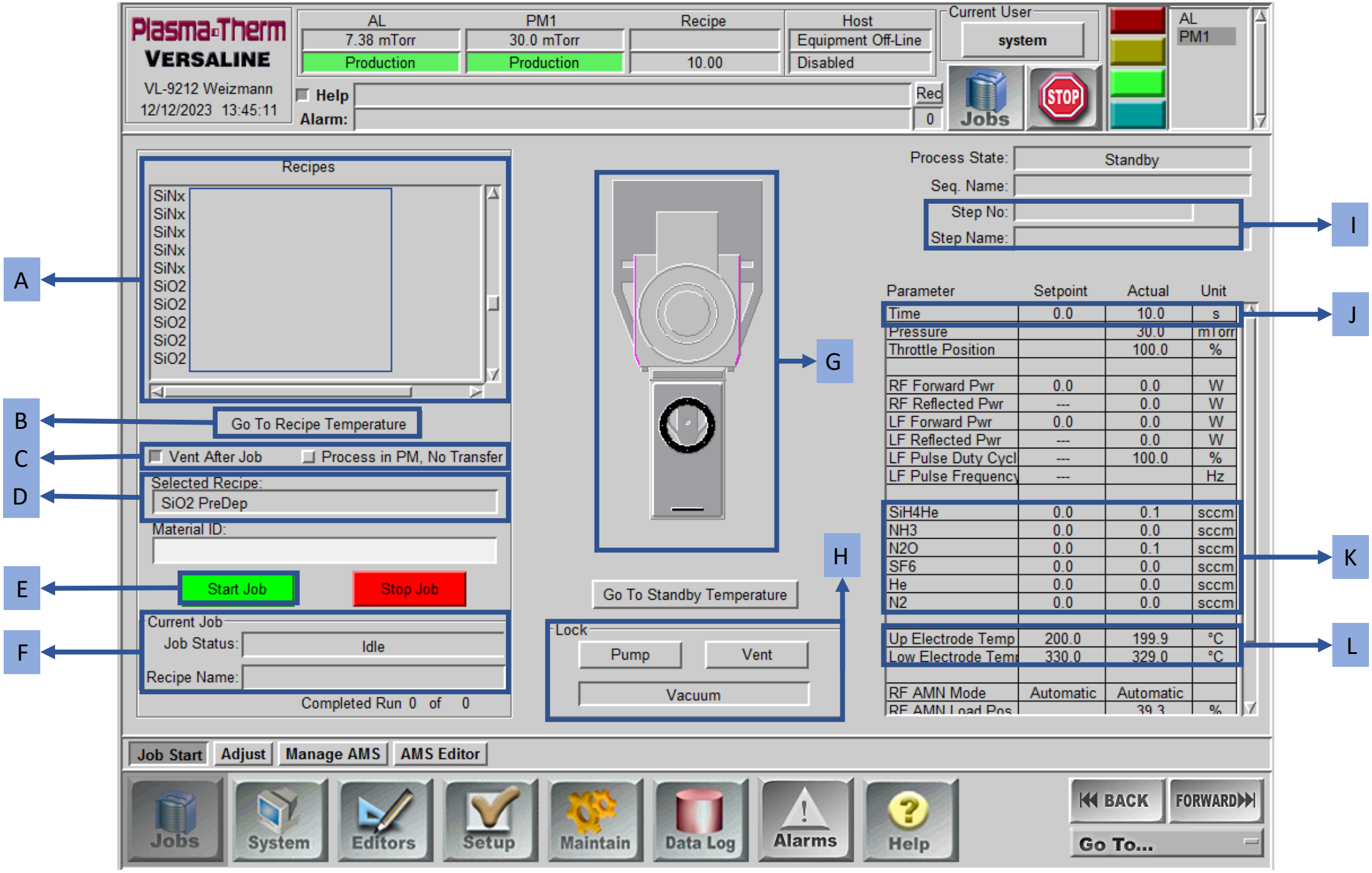
WEIZMANN INSTITUTE OF SCIENCE

Nano Fabrication Center

PECVD

Standard Operating Procedure

Written by Danielle Amit Awaskar


Plasma-Therm
VERSALINE
VL-9212 Weizmann
12/12/2023 13:45:11
AL
7.38 mTorr
Production
PM1
30.0 mTorr
Production
Recipe
10.00
Host
Equipment Off-Line
Disabled
Current User
system
Help
Alarm:
Rec
0
Jobs
STOP
AL
PM1
Recipes
SiNx
SiNx
SiNx
SiNx
SiNx
SiO2
SiO2
SiO2
SiO2
SiO2
Go To Recipe Temperature
Vent After Job
Process in PM, No Transfer
Selected Recipe:
SiO2 PreDep
Material ID:
Start Job
Stop Job
Current Job
Job Status:
Idle
Recipe Name:
Completed Run 0 of 0
Go To Standby Temperature
Lock
Pump
Vent
Vacuum
Process State:
Standby
Seq. Name:
Step No:
Step Name:
Parameter
Setpoint
Actual
Unit
Time 0.0 10.0 s
Pressure 30.0 mTorr
Throttle Position 100.0 %
RF Forward Pwr 0.0 0.0 W
RF Reflected Pwr --- 0.0 W
LF Forward Pwr 0.0 0.0 W
LF Reflected Pwr --- 0.0 W
LF Pulse Duty Cycl --- 100.0 %
LF Pulse Frequency --- Hz
SiH4He 0.0 0.1 sccm
NH3 0.0 0.0 sccm
N2O 0.0 0.1 sccm
SF6 0.0 0.0 sccm
He 0.0 0.0 sccm
N2 0.0 0.0 sccm
Up Electrode Temp 200.0 199.9 °C
Low Electrode Tem 330.0 329.0 °C
RF AMN Mode Automatic Automatic
RF AMN Load Pos 39.3 %
A
B
C
D
E
F
G
H
I
J
K
L
Job Start
Adjust
Manage AMS
AMS Editor
Jobs
System
Editors
Setup
Maintain
Data Log
Alarms
Help
BACK
FORWARD
Go To...

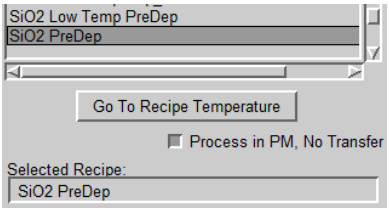
Standard Operating Procedure (SOP)
Plasma-Enhanced Chemical Vapor Deposition (PE-CVD)

1) **Turn on** the nitrogen switch, labeled "**N2 PURGE VALVE**", located on the left side of the computer screen.

Step 1 – Conditioning

2) Choose a suitable conditioning recipe for the material you plan to deposit from the list of recipes [A] and click on it.
   - "**SiNx PreDep**"- for deposition of SiNx (About 12 minutes)
   - "**SiO2 PreDep**"- for deposition of SiO_2 (About 6 minutes)

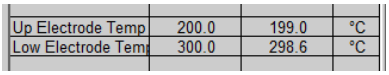
   Confirm that the selected recipe appears in "Selected Recipe" [D].



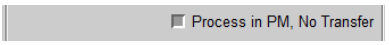
3) Click on "**Go To Recipe Temperature**" [B].

   On the right side of the screen, you will be able to see the temperature of the electrodes defined in the recipe and the actual temperature of the electrodes [L].

   Wait for the temperature of the electrodes to reach the desired temperature.

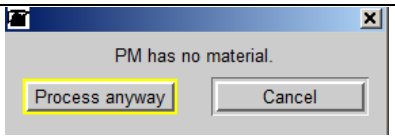


4) Click on "**Process in PM, no Transfer**" [C]. *The button will be gray and not bright.*



5) Click on "**Start Job**" [E].

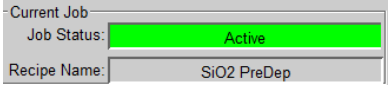
6) A notification will pop up saying "**PM has no material**", select "**Process Anyway**".

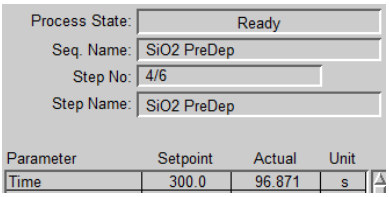


7) *Gases are supplied to the chamber [K] and the conditioning process begins.*

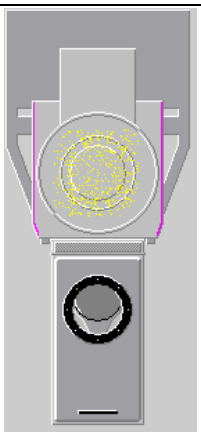
   You can see that the process started [F], the number of steps in the process and what step you are in [I] and the duration of the step [J].

   In the meantime, you can clean up your sample.

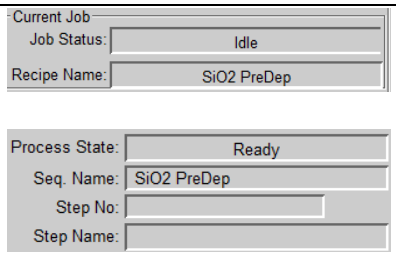




8) *When the plasma starts, you can see it in [G].*

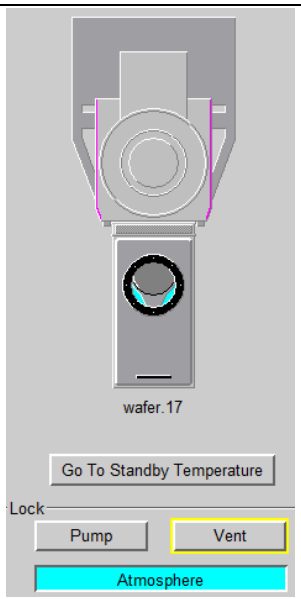


9) *It can be understood that the process is over when it is not written that you are in the middle of a process [F] and that the lines of step number and step name are empty [I].*



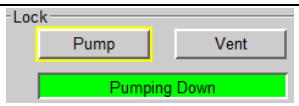
Step 2 – Your process

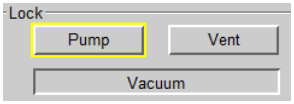
10) Press "**Vent**" [H] and wait until it turns blue and says "Atmosphere".



11) Now you can open the load lock and place your sample in the sample holder with tweezers to **avoid burns from its high temperature (300°C)**. Please use appropriate safety equipment, such as tweezers with insulated handles. Close the lid of the load lock.

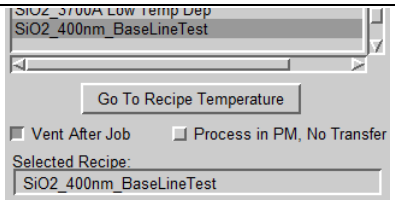
12) Press “**Pump**” and wait until it says “Vacuum” [H].



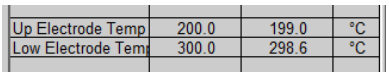


13) Choose **your deposit recipe** from the list of recipes [A] and click on it.

The name of the recipe you selected should appear in “Selected Recipe” [D].



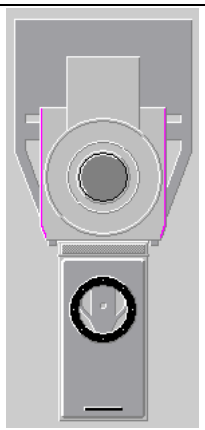
14) Click on “**Go To Recipe Temperature**” [B].
Wait for the temperature of the electrodes to reach the desired temperature.



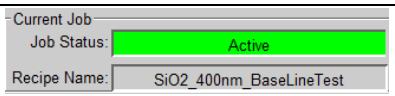
15) Click on “**Process in PM, no Transfer**” [C]. *The button will be bright and not gray.*
And click on “**Vent After Job**” [C]. *The button will be gray and not bright.*

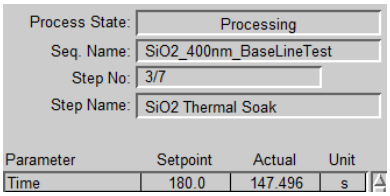
16) Click on “**Start Job**” [E].

17) *First, the arm will insert the sample from the load lock into the chamber. Then it will return empty to load lock and close the gate valve (that separates the load lock from the chamber).*

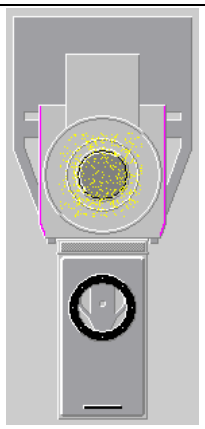


18) *Now the gases are supplied to the chamber [K] and your process begins.*
You can see that the process started [F], the number of steps in the process, what step you are in [I] and how long the step takes [J].

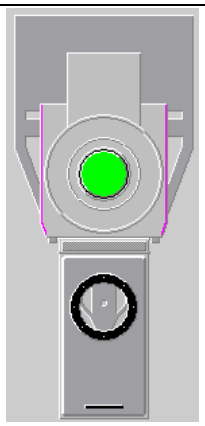


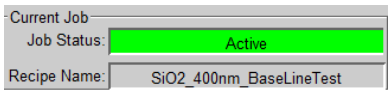


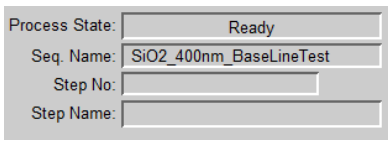
19) *When the plasma starts, you can see it in [G].*



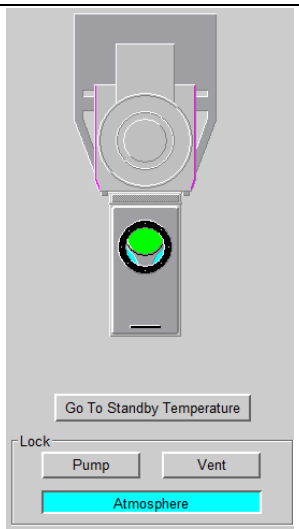
20) *It can be understood that the process is over when the wafer turns green [G] and that the lines of step number and step name are empty [I]. The arm still needs to take your sample out of the chamber to load lock, so it still says that the job is active.*





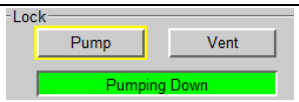


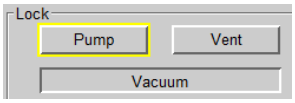
21) The system will vent by itself because we selected it in step 15 so wait until it turns blue and says "Atmosphere".



22) Now you can open the load lock and take out your sample from the sample holder with tweezers to **avoid burns from its high temperature (300°C)**. Please use appropriate safety equipment, such as tweezers with insulated handles. Close the lid of the load lock.

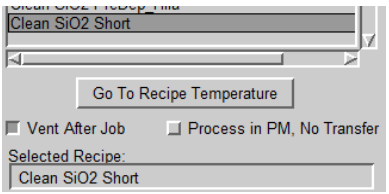
23) Press "**Pump**" and wait until it says "Vacuum" [H].





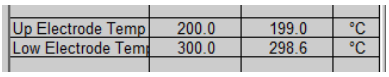
Step 3 – Cleaning

24) Choose a suitable cleaning program for the material you deposited from the list of recipes [A] and click on it.
- "**Clean SiNx Short**"- for deposit of less than 1 µm of SiN_X (About 26 minutes)
- "**Clean SiNx Long**"- for deposit of more than 1 µm of SiN_X (About 51 minutes)
- "**Clean SiO2 Short**"- for deposit of less than 1 µm of SiO_2 (About 26 minutes)
- "**Clean SiO2 Long**"- for deposit of more than 1 µm of SiO_2 (About 51 minutes)



The name of the recipe you selected should appear in "Selected recipe" [D].

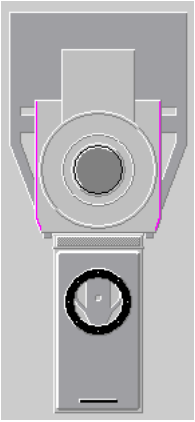
25) Click on "**Go To Recipe Temperature**" [B].
Wait for the temperature of the electrodes to reach the desired temperature.



26) Click on "**Process in PM, no Transfer**" [C]. *The button will be bright and not gray.*
And click on "**Vent After Job**" [C]. *The button will be gray and not bright.*

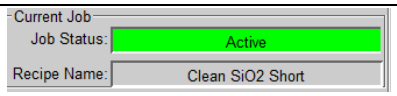
27) Click on "**Start Job**" [E].

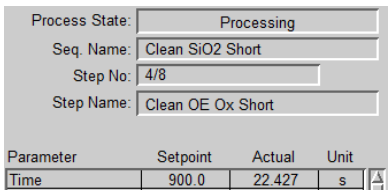
28) *First, the arm will insert the sample from the load lock into the chamber. Then it will return empty to load lock and close the gate valve (that separates the load lock from the chamber).*



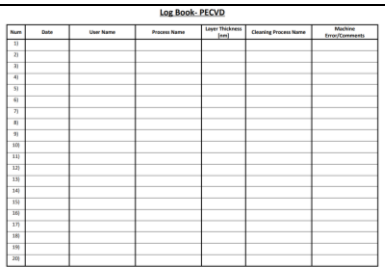
29) *Now the gases are supplied to the chamber [K] and the cleaning process begins.*

You can see that the process started [F], the number of steps in the process, what step you are in [I] and how long the step takes [J].

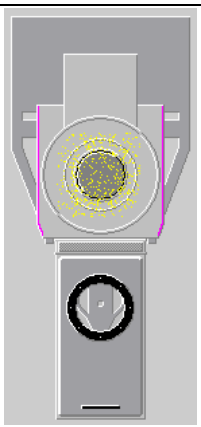




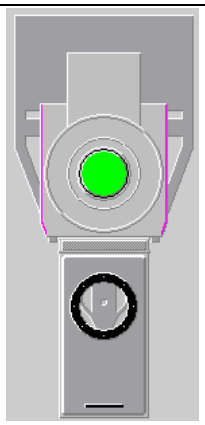
30) Fill in the **Log-Book** and write down all the details of the process you ran.

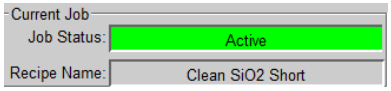


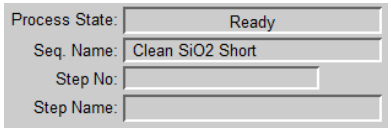
31) *When the plasma starts, you can see it in [G].*



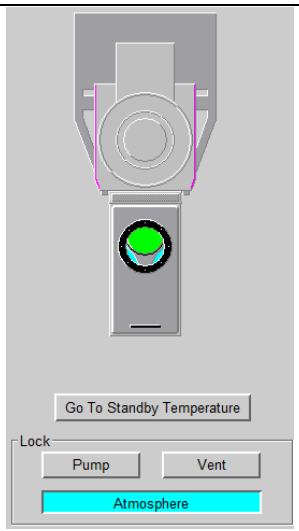
32) *It can be understood that the process is over when the wafer turns green [G] and that the lines of step number and step name are empty [I]. The arm still needs to take your sample out of the chamber to load lock, so it still says that the job is active.*





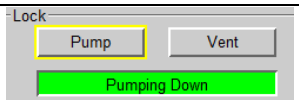


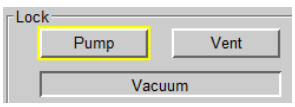
33) The system will vent by itself because we selected it in step 26 so wait until it turns blue and says "Atmosphere".



34) Now you can open the load lock and check that the holder is indeed clean. **A reminder: exercise caution to avoid burns from its high temperature (300°C)**. Close the lid of the load lock.

35) Press "**Pump**" and wait until it says "Vacuum" [H].





36) **Turn off** the nitrogen switch: "**N2 PURGE VALVE**", which is on the left side of the computer screen.

37) Before leaving, conduct a final check to ensure the work environment is clean, and all equipment is properly stored.

If you encounter any difficulties or problems, please contact the person in charge of the device- Danielle Amit Awaskar at extension 2129