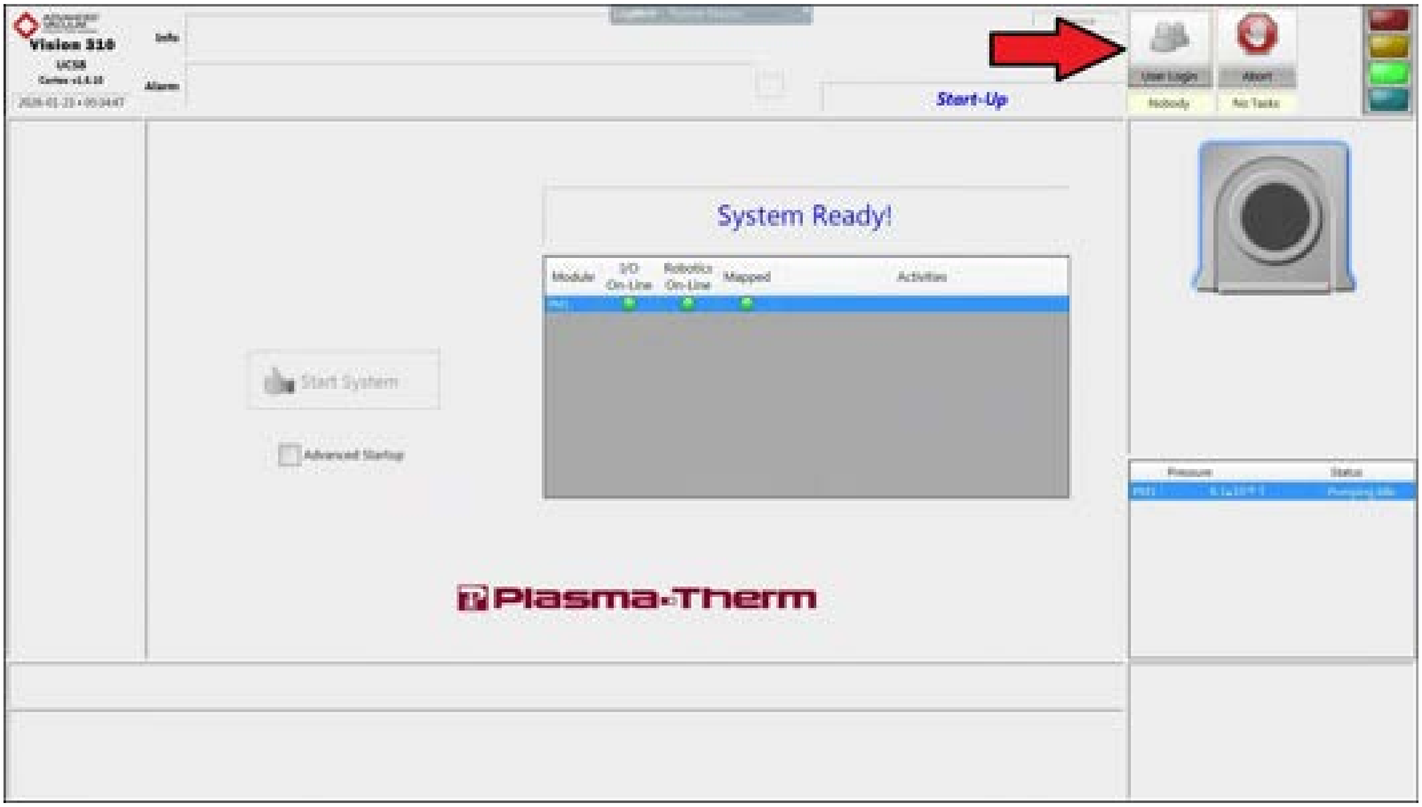
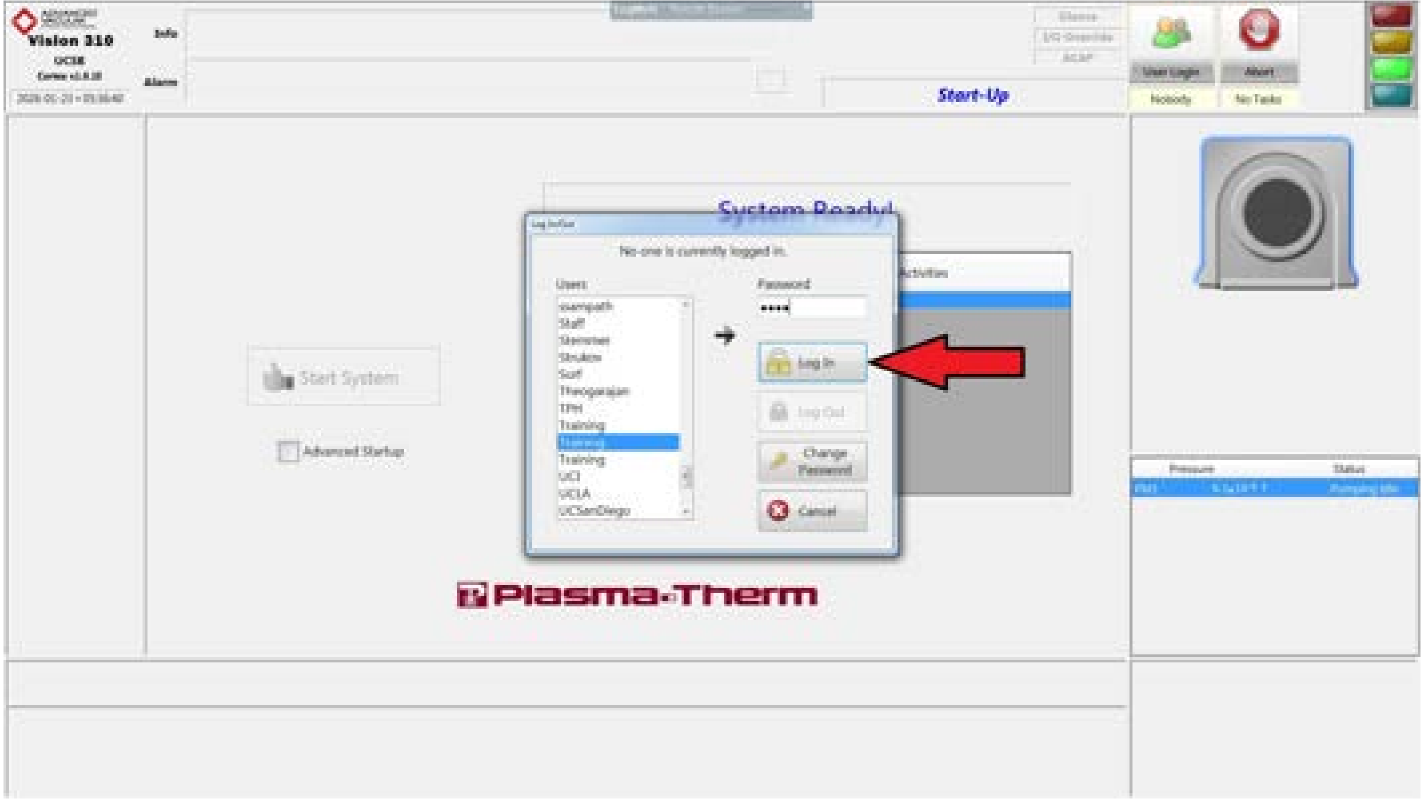
PECVD2
Standard Operating Procedure

1. Section 1, Operation



System Ready!

1.1. Log into your group's account by selecting on the "User Login" button.



No-one is currently logged in.

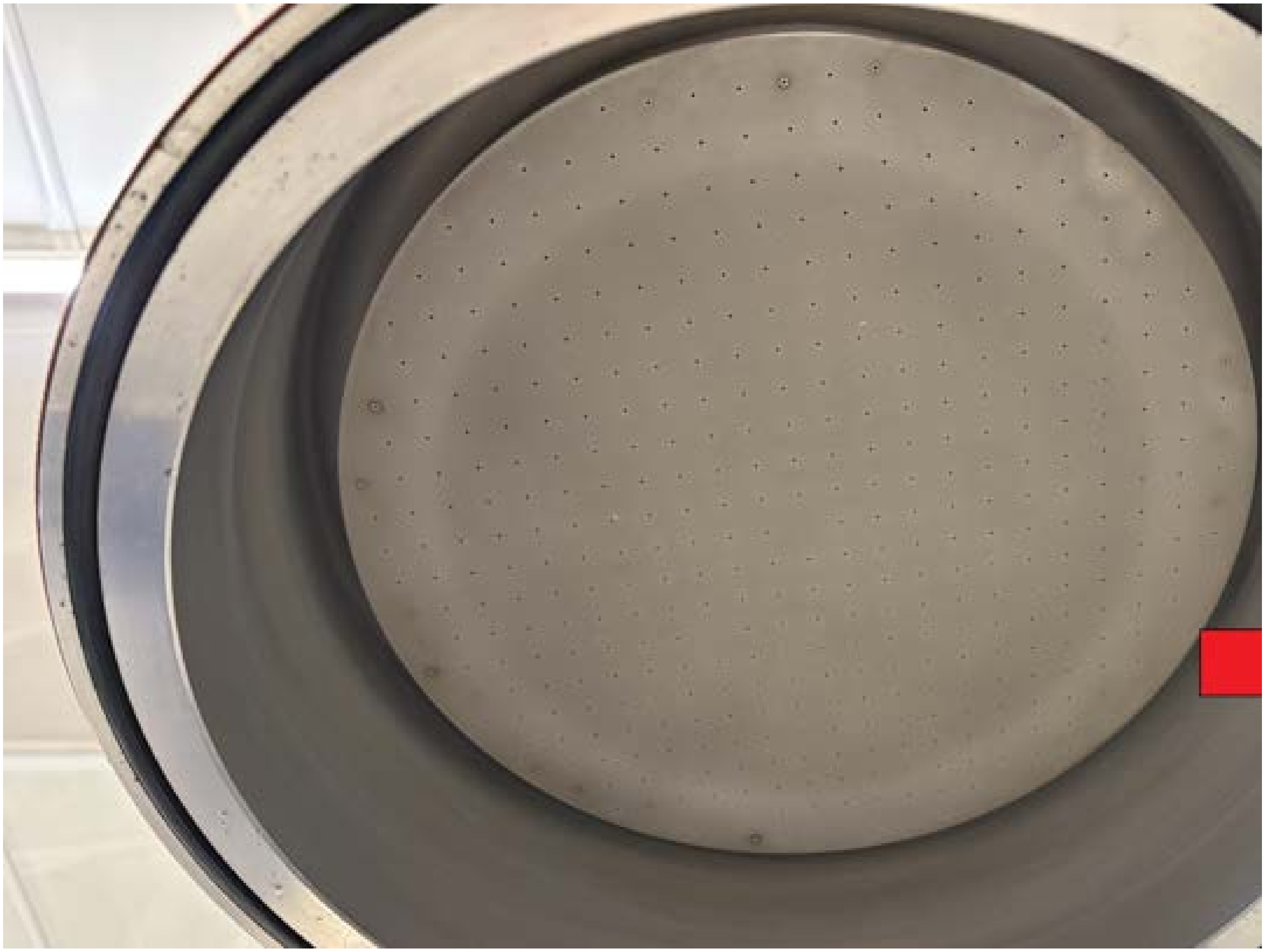
Users: ssampath, Staff, Stemmer, Strukov, Surf, Theogarajan, TPH, Training, Training, Training, UCI, UCLA, UCSanDiego

1.2. Select your group's account, enter your group's password, and select "Log In".

1.3. Before starting any processing, vent and open the chamber to do a quick visual inspection for debris or contamination. Start by venting the chamber by selecting the "Vent" button.

1.4. Once the chamber has vented, the lid motion options will become available, as well as the chamber illustration to the upper right of the screen will show the chamber as light blueish color. You will then select the "Open Lid" button. A pop up window will ask you to verify that you want to open the lid, and you will select "Open Lid".
The chamber will then move UP, and then it will swivel to the Right.

1.5. Check for debris or contamination on the chuck or around the chamber sealing surface.
If debris or contamination is found, use the N2 gun to clean the area, being careful not to touch the chuck.
Touching the chuck could result in serious burns/injury due to the high chuck temperature.



1.6. Verify that the Gas Port o-ring is in place. If the Gas Port o-ring is not in place, deposition rate and uniformity will be affected.

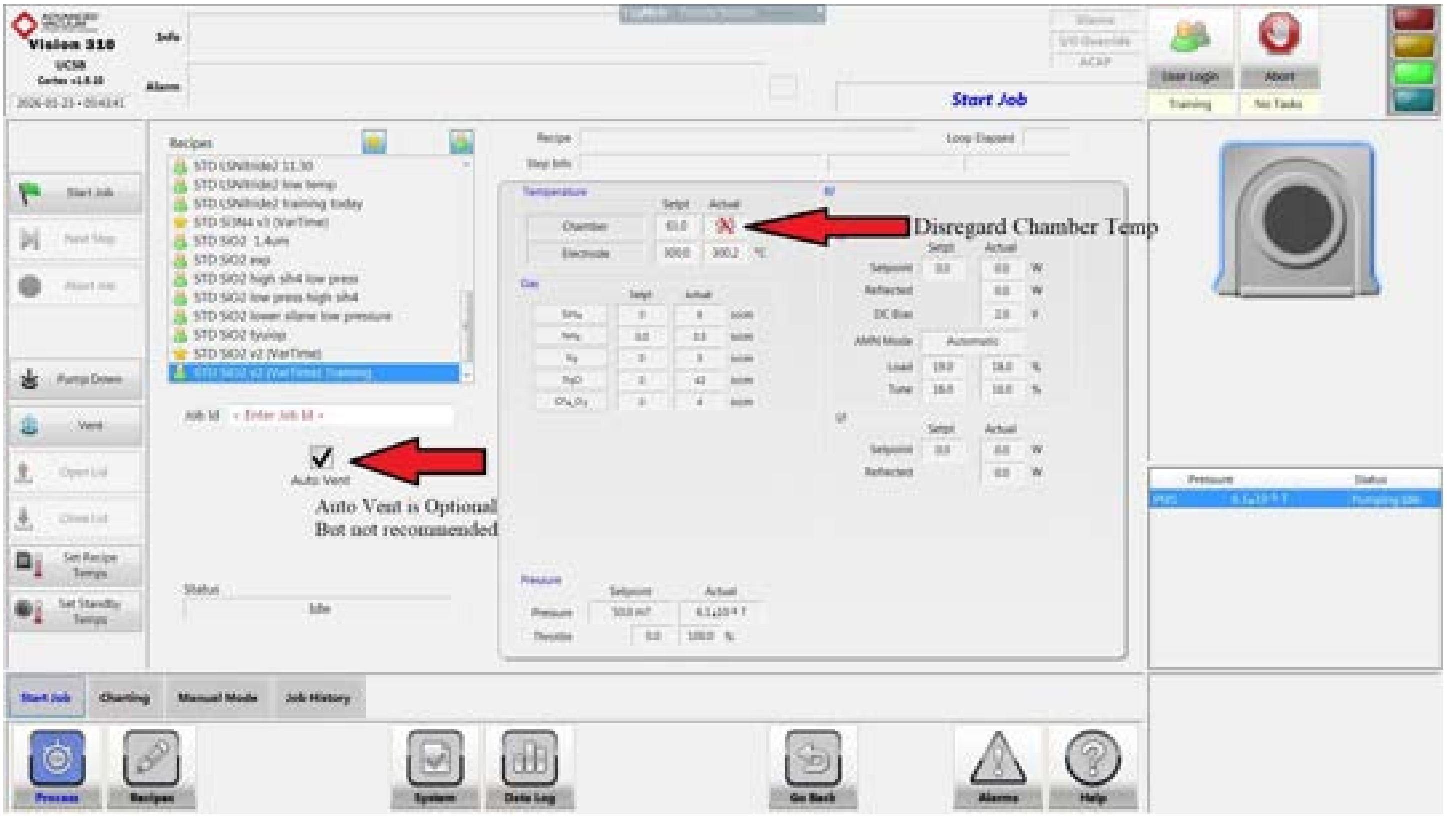
If the Gas Port o-ring is not in place, take a quick look around and see if it is on the deck of the system, or on the floor. The o-ring can be cleaned with an IPA wipe and pressed back into place by hand.

If you are not comfortable reinstalling the o-ring, or you can not find the o-ring, report a problem in Sign Up Monkey, and DO NOT run the system until it has been replaced.

1.7. Close the chamber lid by selecting the “Close Lid” button. (You will not be loading your parts yet.)

1.8. Once the chamber lid has closed, pump the chamber down by selecting the “Pump Down” button.

** If you are running a process that is not the standard 300C temp, See Step 1.21 before continuing to step 1.9.



Disregard Chamber Temp

Auto Vent is Optional
But not recommended

*** Disregard Chamber Temp, it does not work.**

1.9. Select a standard coat recipe for the material you will be depositing. For an example, in the illustration you will see that the recipe selected is “10 minute coat STD SiO2” from the “Production” recipe list.

The following illustration you will see that there are “Production” recipes and “Personal” recipes.

***Production** recipes are our standard recipes that users **are not allowed** to edit or modify with the exception of changing the time on variable time recipes.

***Personal** recipes are your group’s personal recipes and these recipes may be edited or modified as needed by the users in your group.

1.10. Select the “Start Job” button to start the chamber coating process.

1.11. Once the chamber coating process has completed, you will then Vent the chamber by selecting the “Vent” button, as seen in Step 1.3

1.12. Once the chamber has completed venting, you will then Open the chamber by selecting the “Open Lid” button, as seen in Step 1.4 (There will be a pop up window confirming your request)

1.13. Once the chamber lid has opened, you may place your wafer(s)/sample(s) on the chuck.
**** ONLY METAL TIPPED TWEEZERS ARE ALLOWED TO BE USED****
You may use glass slides to prevent your wafer(s)/sample(s) from moving on the chuck.
**** BE VERY CAREFUL NOT TO TOUCH THE CHUCK AS IT IS VERY HOT****

1.14. Once your wafer(s)/sample(s) have been loaded, you will then Close the chamber by selecting the “Close Lid” button, as seen in Step 1.7 (There will be a pop up window confirming your request)

1.15. Once the chamber lid has closed, you will pump down the chamber by selecting the “Pump Down” button, as seen in Step 1.8

1.16. Once the chamber has pumped down to 20mtorr or better, select the recipe for the material that you will be depositing, as seen in Step 1.9

1.17. Select the “Start Job” button to start the deposition recipe, as seen in Step 1.10

1.18. Once the deposition process has completed, you will then Vent the chamber by selecting the “Vent” button, as seen in Step 1.3

1.19. Once the chamber has completed venting, you will then Open the chamber by selecting the “Open Lid” button, as seen in Step 1.4 (There will be a pop up window confirming your request)

1.20. Once the chamber lid is open, you will be able to retrieve your wafer(s)/sample(s).

*If you are depositing more than 1 run, go back to Step 1.13 and continue until you have completed your depositions.

*If you have completed your depositions, proceed to Section 2 Chamber Cleaning.

Changing Chuck Temperature:

1.21. To Change the Chuck Temperature, first select the recipe that you would like to run that has a non standard electrode temperature (Standard electrode temp is 300C), then select the “Set Recipe Temps” button. This will change the “Electrode” set point. The chuck takes approximately 45min to cool down to 150C from 300C.

1.22. To change the Chuck Temperature back to the standard temperature of 300C, select any standard recipe and select the “Set Recipe Temps” button. The chuck takes approximately 10min to heat up to 300C from 150C.

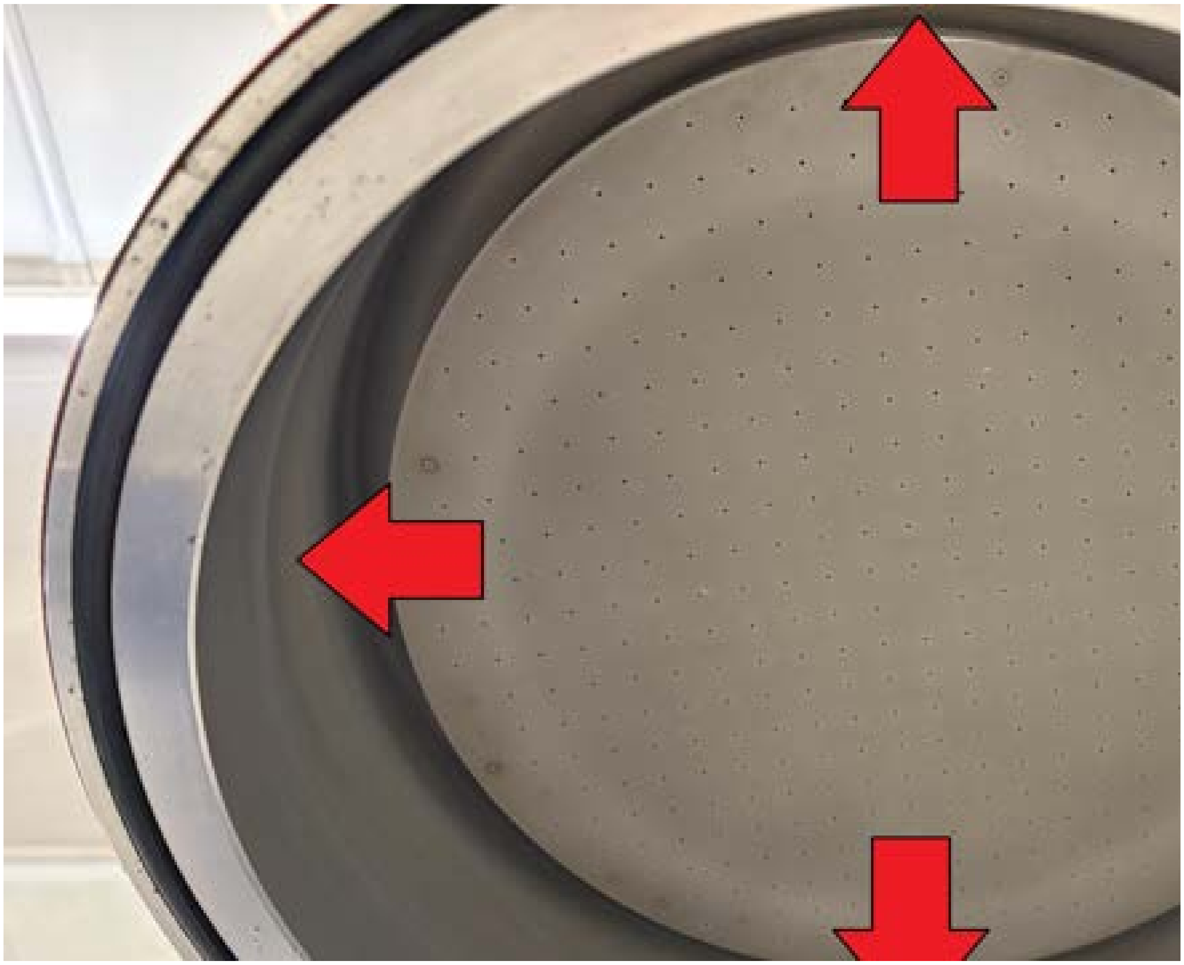
2. Section 2, Chamber Cleaning

The chamber **Must** be cleaned after 60min of deposition and upon completion of your depositions.

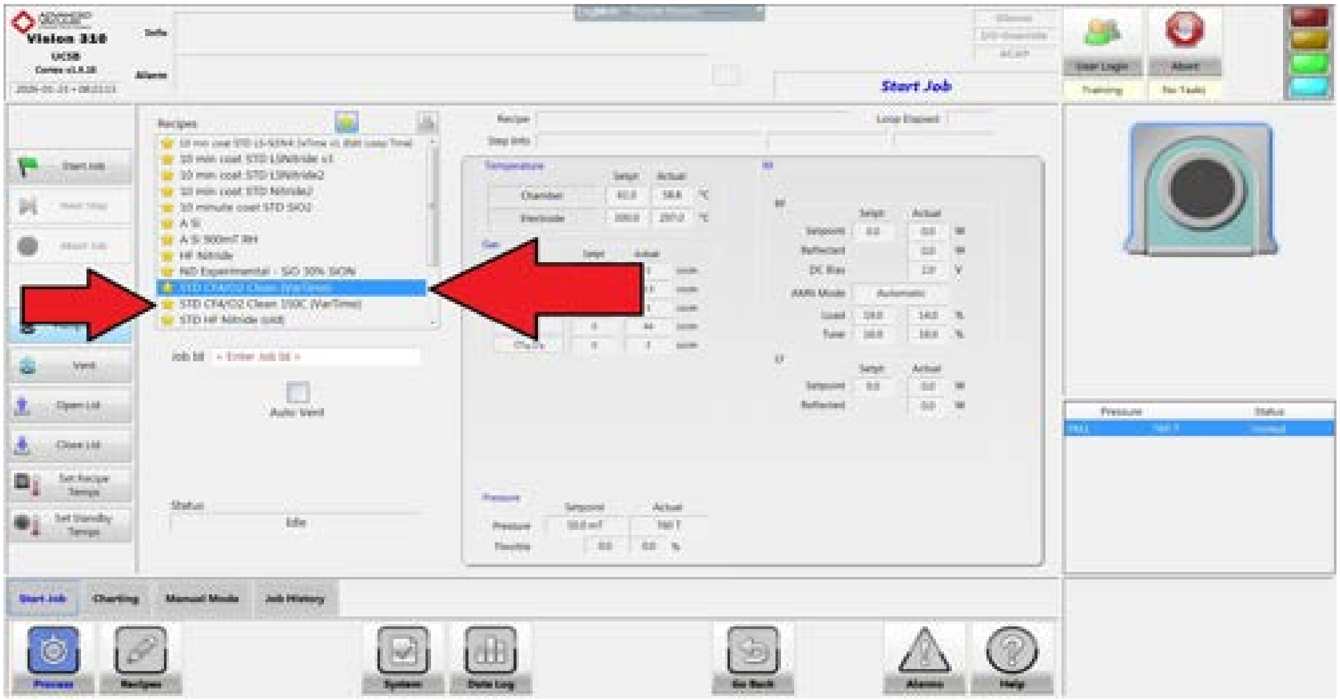
SiO2 =1 minute of clean for every 1 minute of deposition.
SiN = 1 minute of clean for every 7 minutes of deposition.
A-Si = 1.5 minute of clean for every 1 minute of deposition.

* Cleaning the chamber during 150C depositions are to be cleaned at 150C, and your final clean **Must** be ran at 300C.

2.1. To clean the chamber, first you will vent, and then open the chamber as shown in steps 1.3 and 1.4.



2.2. Using clean room wipes, wet with DI water, wipe the circumference of the chamber, being careful not to touch the shower head.
2.3. Using clean room wipes, wet with IPA, wipe the circumference of the chamber, being careful not to touch the shower head.
2.4. Using the clean room wipes that are wet with IPA, wipe the chamber o-ring and then verify that the gas port o-ring is in place as seen in Step 1.6.
2.5. Next you will close the chamber, and Pump down the chamber as seen in Steps 1.7 and 1.8.



2.6. You will then select the clean recipe.

The only clean recipes you are approved to use are the Production recipes:

STD CF4/O2 Clean (VarTime)
STD CF4/O2 Clean 150C (VarTime)

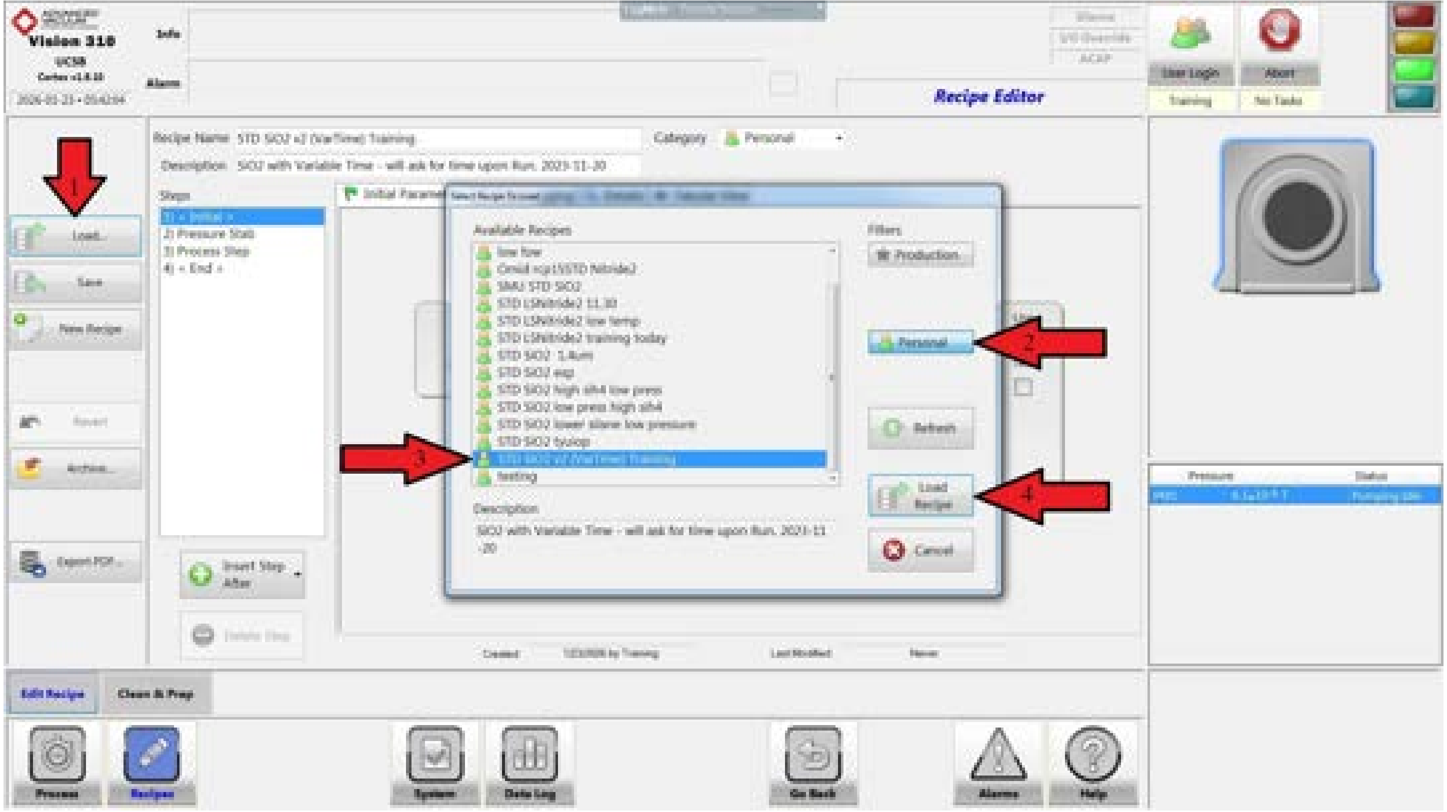
-If you are running a 150C deposition, and you need to clean the chamber in between 150C runs, you are to use STD CF4/O2 Clean 150C (VarTime).
-If you are running a 150C deposition, and you have completed all of your depositions, you **Must** use STD CF4/O2 Clean (VarTime), and allow the chamber to heat back up to 300C before you start the clean run.
-Temperature changes take extra time. To cool the chuck from 300C to 150C takes an average of 45min. To heat the chuck from 150C to 300C takes an average of 10min.

Plan your time and reservations accordingly, and you must include the entire final chamber clean time in your reservation.

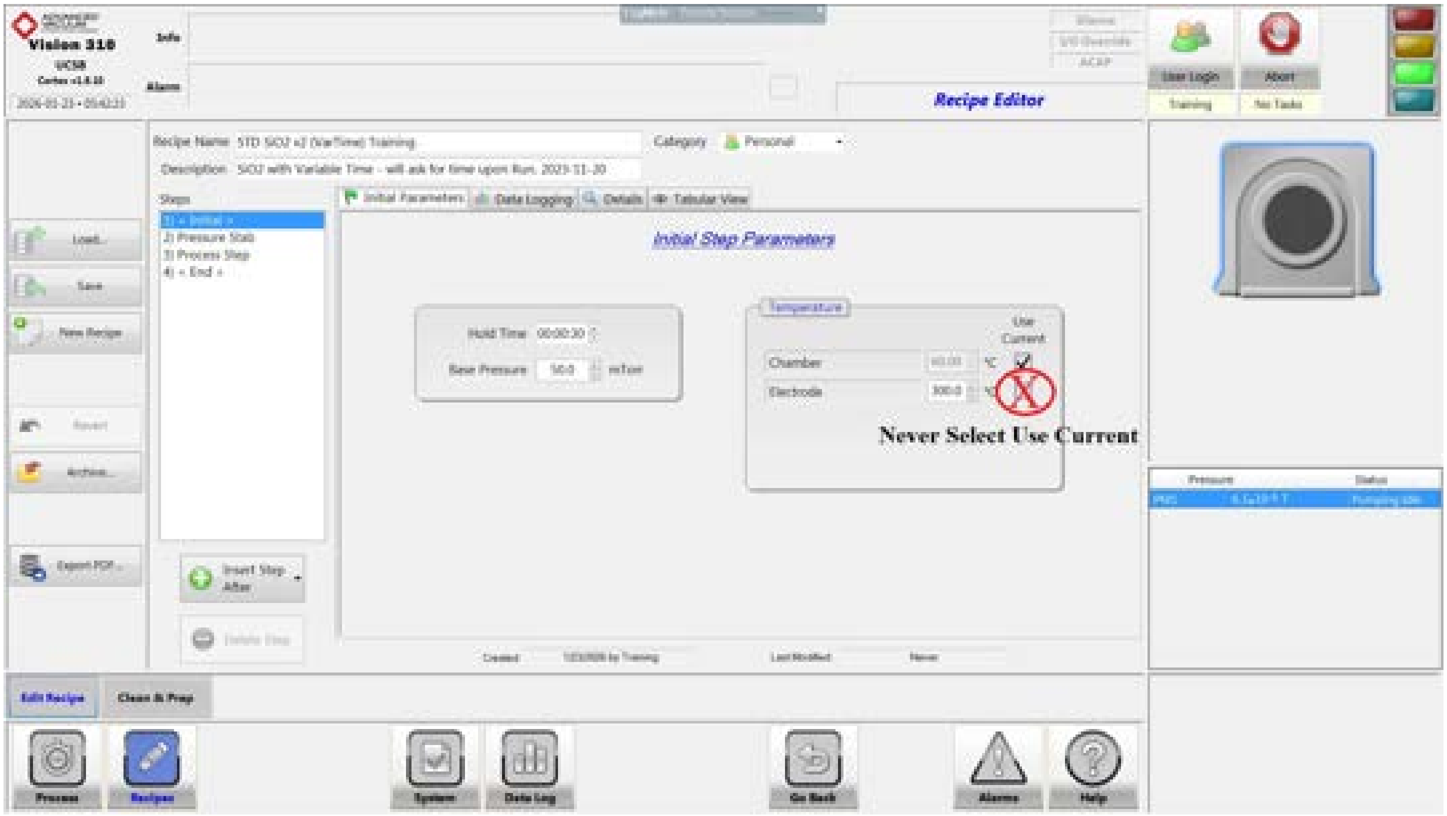
SiO2 =1 minute of clean for every 1 minute of deposition.
SiN = 1 minute of clean for every 7 minutes of deposition.
A-Si = 1.5 minute of clean for every 1 minute of deposition.

Editing A Recipe

3.1. To edit your recipes, first select the "Recipes" tab at the lower left of the screen.



3.2. To edit a recipe, first you will select the "Load" button. On the pop up window, you will then select the "Personal" button to bring up your group's personal recipes, and then you will select the recipe you would like to edit. Finally selecting "Load Recipe" button.



Recipe Name: STD SiO2 x2 (VarTime) Training
Category: Personal
Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

Steps:
1) < Initial >
2) Pressure Stab
3) Process Step
4) < End >

Initial Parameters | Data Logging | Details | Tabular View

Initial Step Parameters

Hold Time: 00:00:30
Base Pressure: 50.0 mTorr

Temperature

			Use Current
Chamber	[illegible]	°C	☑
Electrode	300.0	°C	☒

Never Select Use Current

3.3. The recipe parameters will then be available for editing. This illustration shows the “Initial Parameters” page. (Never select “Use Current” for the Electrode Temperature setting.)

Recipe Name: STD SiO2 x2 (VarTime) Training
Category: Personal
Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

Steps:
1) < Initial >
2) Pressure Stab
3) Process Step
4) < End >

Process Parameters | Details | Tabular View

Step Name: Process Step
Description: Enter deposition time

Step Termination
End By: Variable Time
Def. Time: 10 : 0.0 min : s

Pressure
Pressure: 800.0 mTorr

Gas (sccm)

SiH_4	[illegible]	sccm
NH_3	0.0	sccm
N_2	0	sccm
N_2O	1900	sccm
$CF_4\_O_2$	0	sccm

RF
Setpoint: [illegible] W
AMN Mode: Automatic
Load/Tune: [illegible] %
Setpoint: 0 W

You can change the parameters for each step by selecting the step as seen in this illustration.

Recipe Name: STD SiO2 x2 (VarTime) Training
Category: Personal
Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

Steps:
1) < Initial >
2) Pressure Stab
3) Process Step

Step Name: Process Step
Description: Enter deposition time

End By: Variable Time
Def. Time: 10 : 0.0 min : s

SiH_4	250	sccm
NH_3	0.0	sccm
N_2	0	sccm
N_2O	1900	sccm
$CF_4\_O_2$	0	sccm

Setpoint: 60 W
AMN Mode: Automatic
Setpoint: 0 W

Pressure: 800.0 mTorr

3.4. Once all edits have been made, select the “Save” button.

Recipes:
- 10 min coat STD Nitride2
- 10 minute coat STD SiO2
- 5 minute coat STD SiO2
- A Si
- A Si 900mT RH
- dec 17th STD SiO2
- HF Nitride
- low flow
- ND Experimental - SiO 30% SiON
- Omid rcp15STD Nitride2
- SMU STD SiO2
- STD CF4O2 Clean (VarTime)

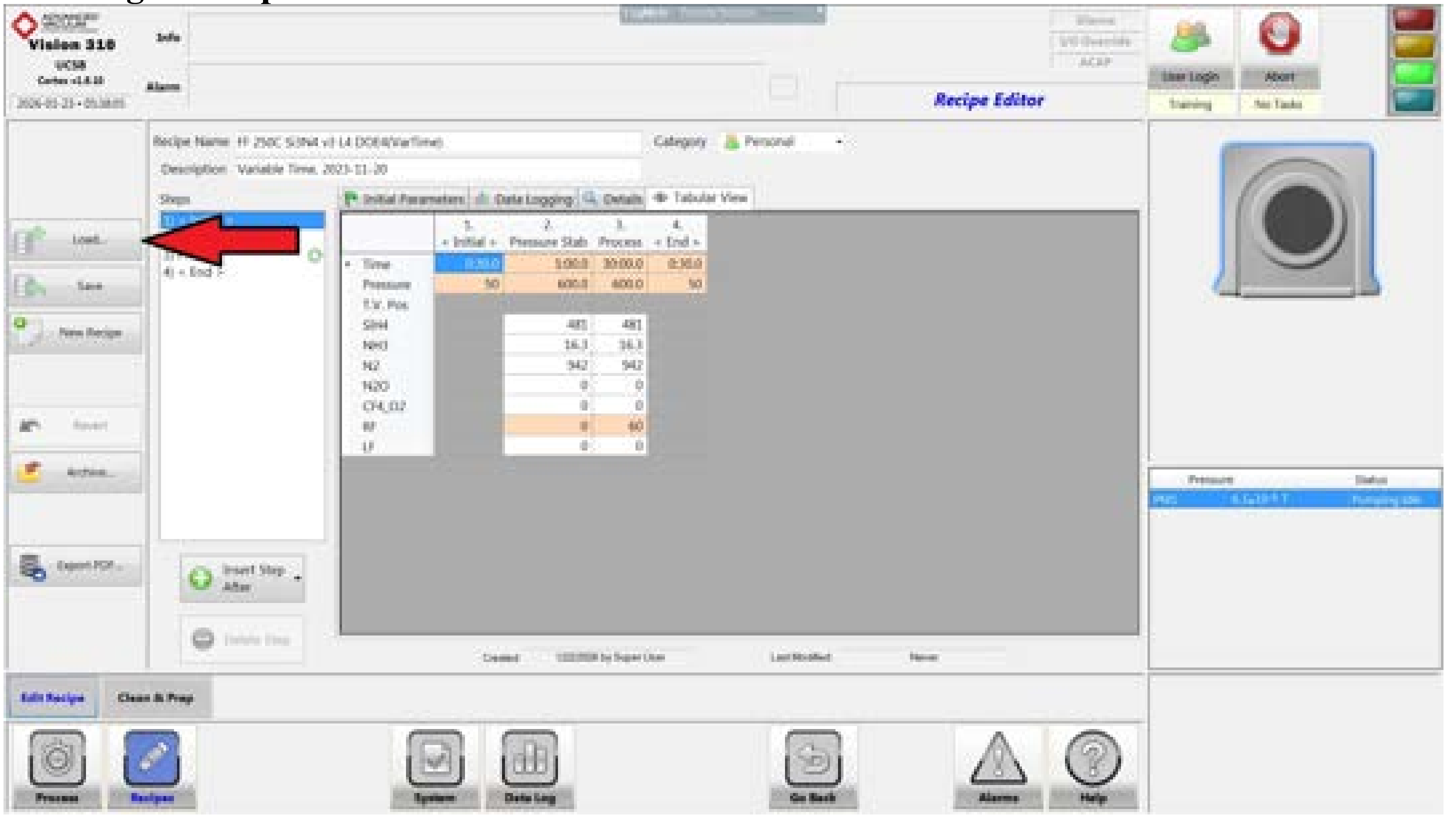
Job Id: < Enter Job Id >

☑ Auto Vent

Status: Idle

3.5. Select the “Process” button at the lower left of the screen to go back to the “Process” screen, so that you can start your run.

Creating A Recipe:

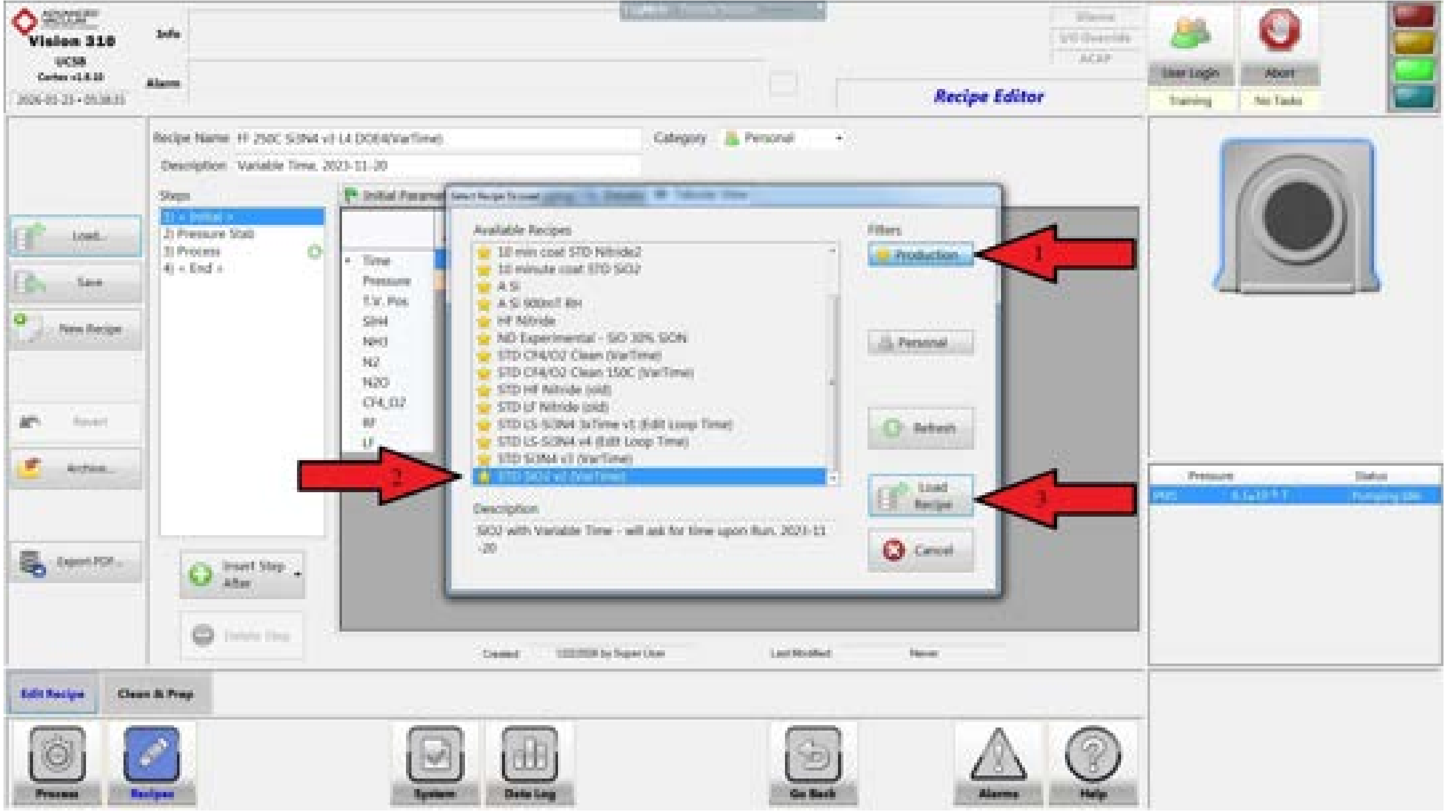


Recipe Name: FF 250C Si3N4 v3 L4 DOE4(VarTime)
Category: Personal
Description: Variable Time, 2023-11-20

Steps:
1) < Initial >
4) < End >

	1. < Initial >	2. Pressure Stab	3. Process	4. < End >
Time	0:30.0	1:00.0	30:00.0	0:30.0
Pressure	50	600.0	600.0	50
T.V. Pos				
SiH4		481	481	
NH3		16.3	16.3	
N2		942	942	
N2O		0	0	
CF4_O2		0	0	
RF		0	60	
LF		0	0	

3.6. To create a recipe, you may use a production recipe as a template. To do this, you will first load a "Production" recipe, then save it as a "Personal" recipe **before making any edits or modifications**. On the "Recipes" page, Select the "Load" button.



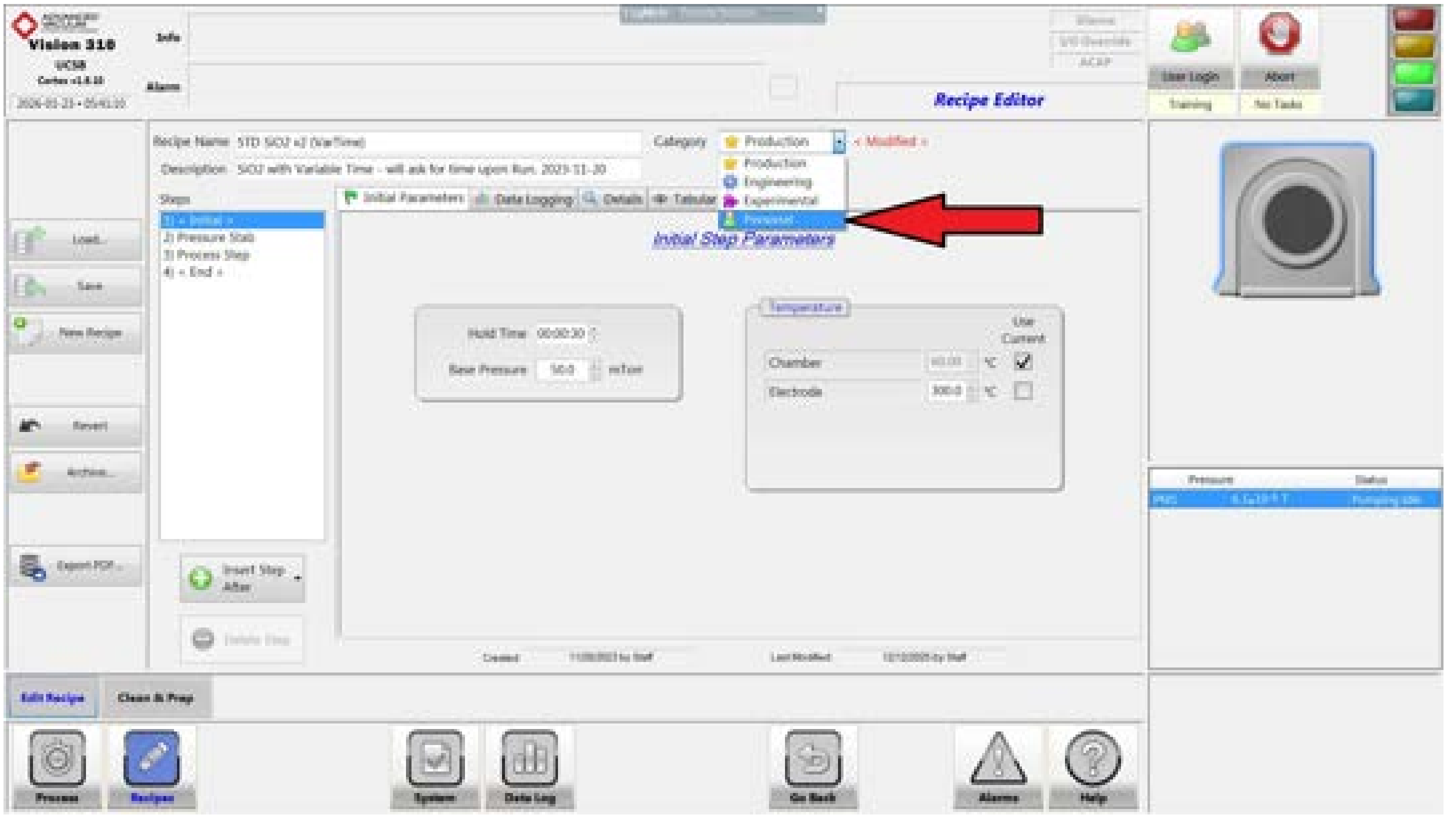
Recipe Name: FF 250C Si3N4 v3 L4 DOE4(VarTime)
Category: Personal
Description: Variable Time, 2023-11-20

Steps:
1) < Initial >
2) Pressure Stab
3) Process
4) < End >

Available Recipes:
- 10 min coat STD Nitride2
- 10 minute coat STD SiO2
- A Si
- A Si 900mT RH
- HF Nitride
- ND Experimental - SiO 30% SiON
- STD CF4/O2 Clean (VarTime)
- STD CF4/O2 Clean 150C (VarTime)
- STD HF Nitride (old)
- STD LF Nitride (old)
- STD LS-Si3N4 3xTime v1 (Edit Loop Time)
- STD LS-Si3N4 v4 (Edit Loop Time)
- STD Si3N4 v3 (VarTime)
- STD SiO2 v2 (VarTime)

Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

3.7. There will be a pop up window where you will first select "Production", then select the recipe you wish to use as a template, and then "Load Recipe".

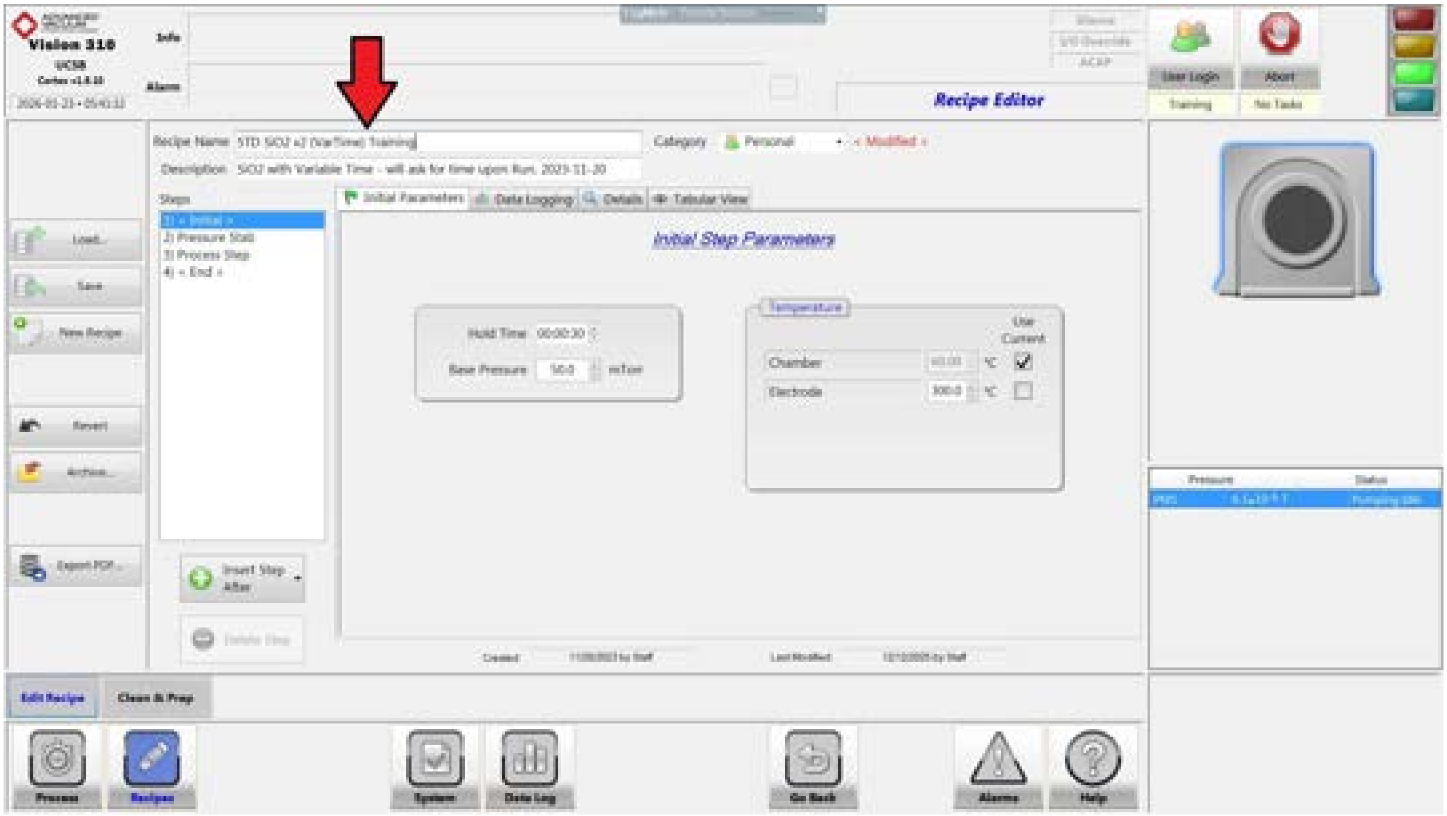


Recipe Name: STD SiO2 x2 (VarTime)

Category: Production

Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

3.8. **Before making any edits or modifications,** Change the "Category" from "Production" to "Personal".



Recipe Name: STD SiO2 x2 (VarTime) Training

Category: Personal

Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

3.9. Change the "Recipe Name" to what you would like the recipe to be called.

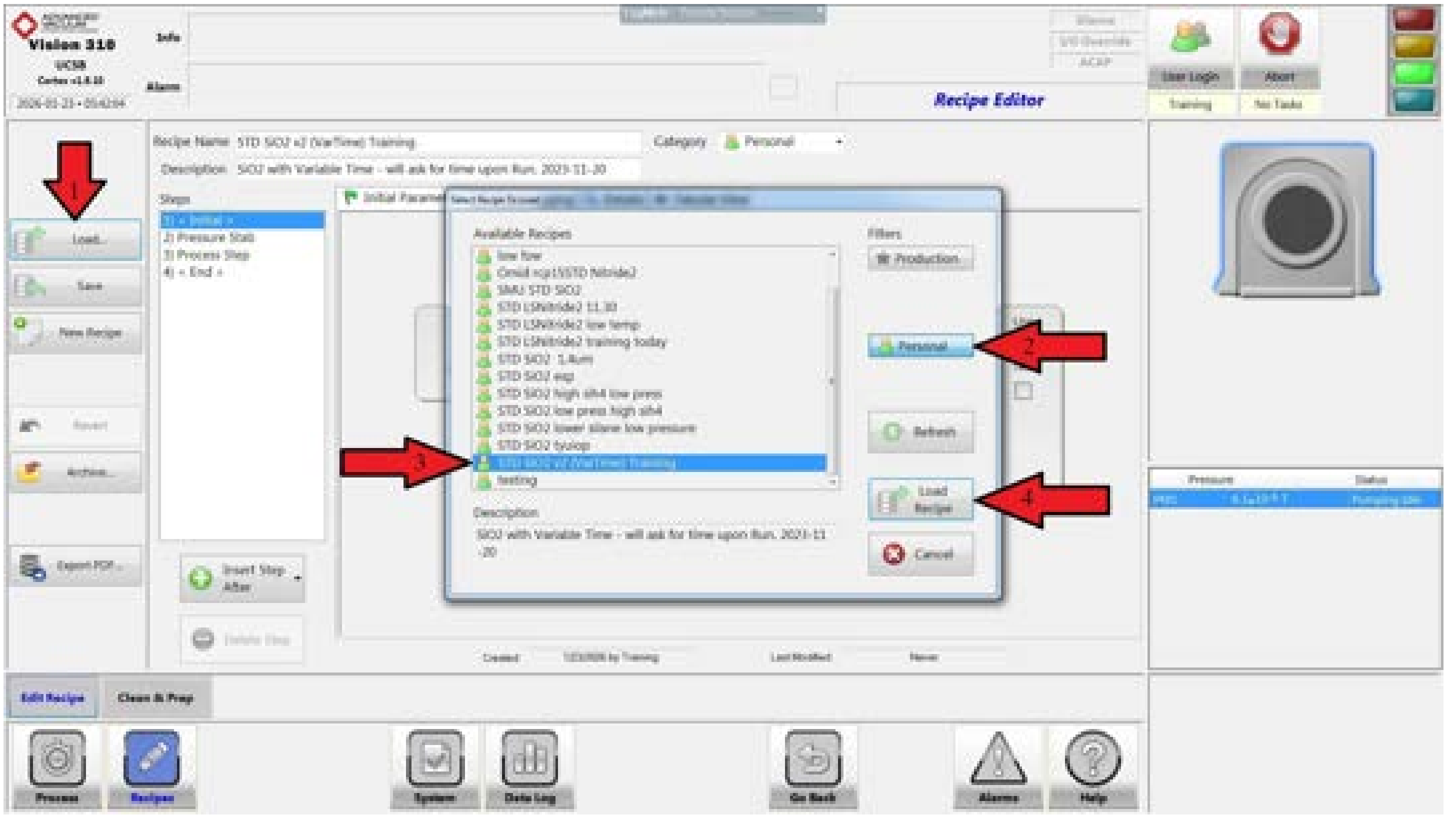
Recipe Name: STD SiO2 v2 (VarTime) Training
Category: Personal - Modified -
Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

Steps
1) < Initial >
2) Pressure Stab
3) Process Step

Hold Time: 00:00:30
Base Pressure: 50.0 mTorr

Chamber ℃ ☑
Electrode 300.0 ℃ ☐

3.10. Next select “Save”.



Recipe Name: STD SiO2 v2 (VarTime) Training
Category: Personal
Description: SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

Steps
1) < Initial >
2) Pressure Stab
3) Process Step
4) < End >

Available Recipes
low flow
Omid rcp1STD Nitride2
SMU STD SiO2
STD LSNitride2 11.30
STD LSNitride2 low temp
STD LSNitride2 training today
STD SiO2 1.4um
STD SiO2 exp
STD SiO2 high sih4 low press
STD SiO2 low press high sih4
STD SiO2 lower silane low pressure
STD SiO2 tyulop
STD SiO2 v2 (VarTime) Training
testing

Description
SiO2 with Variable Time - will ask for time upon Run. 2023-11-20

3.11. **Before making any edits or modifications,** you will now need to load the Personal recipe that you just created to prevent any edits or modifications from being applied to the Production recipe. First select “Load”, “Personal”, and then select the recipe you just created. Finally selecting the “Load Recipe” button. You may now make edits or modifications to your new recipe as seen in Steps 3.3 - 3.5.