CORAL Name: STS-CVD

Location: 8U
Tool Category: Deposition
Contact: Donal Jamieson

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Introduction

Model: ICP MMPLEX.

The STS CVD machine is a Plasma Enhanced Chemical Vapour Deposition tool capable of depositing Silicon Dioxide (SiO_2), Silicon Nitride (Si_3N_4), Silicon Carbide (SiC), amorphous Silicon (α-Si) and Phosphorous-doped amorphous Silicon films on 4" and 6" wafers, and also on wafer pieces.



Safety

Do not try to defeat any interlock on the system. This system utilises RF radiation, high voltage electricity and extremely hazardous gases. The plasma generated during deposition radiates UV, it is blocked by the chamber viewport material but users should not spend much time viewing the plasma. Keep your hands away from all moving parts and be aware of the loadlock lid as a pinch point. Be sure that all covers are in place when you are processing. When the sample is leaves the process chamber it is typically at 300°C, take care removing it from the loadlock. If you encounter any equipment problems while operating the system, contact the technical staff in charge of the system - do not try repairs on your own.

Hazardous gases used in this system:

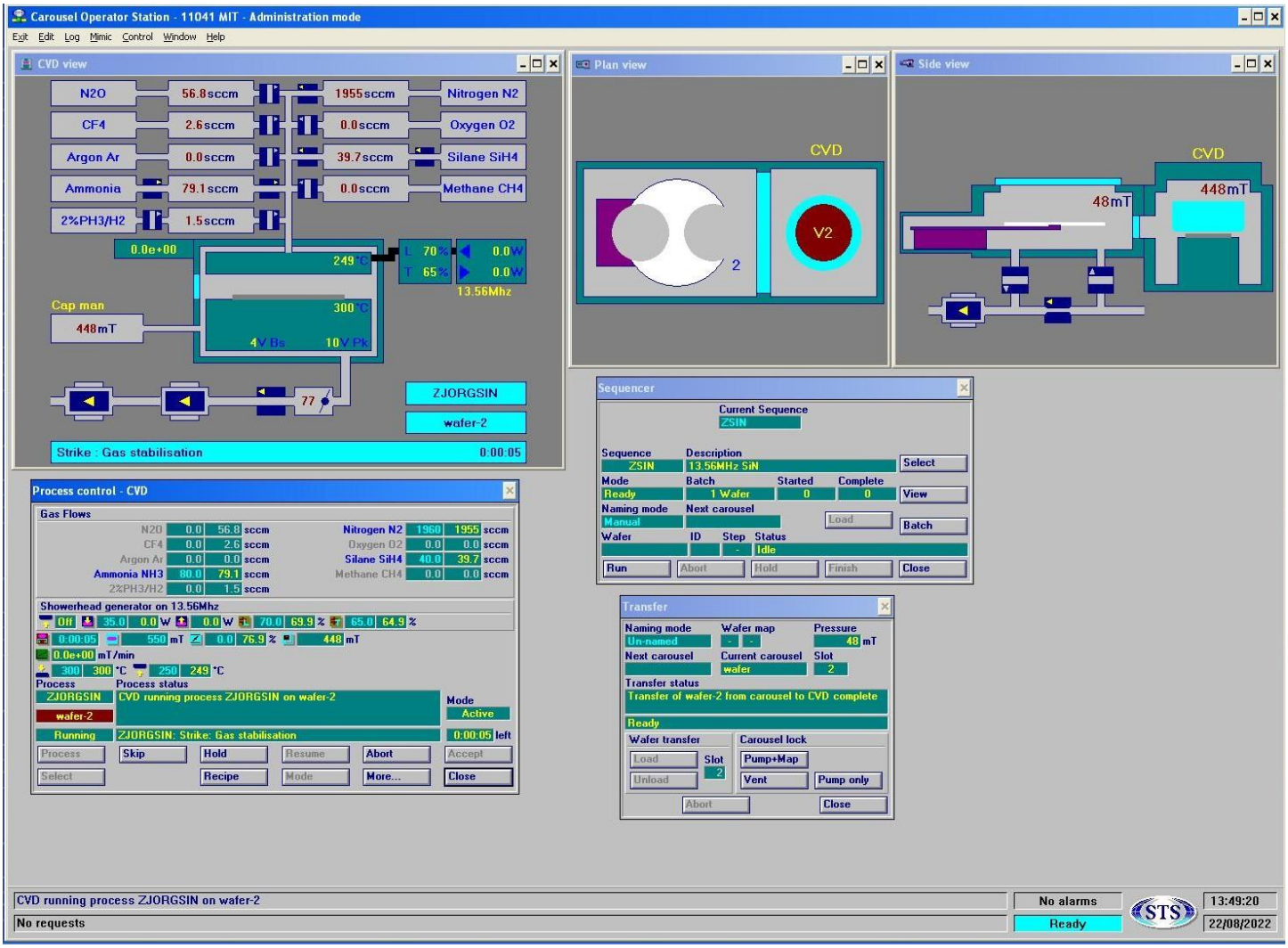
Silane	SiH_4	Pyrophoric
Phosphine/Hydrogen	PH_3/H_2	Pyrophoric/Toxic/Corrosive
Nitrous	N_2O	Oxidizer
Methane	CH_4	Flammable
Ammonia	NH_3	Corrosive

User Qualifications and Responsibilities

It is the User's responsibility to report any issues with the system in CORAL.
When the process run is complete, user should pump the loadlock down.

Operating Procedures

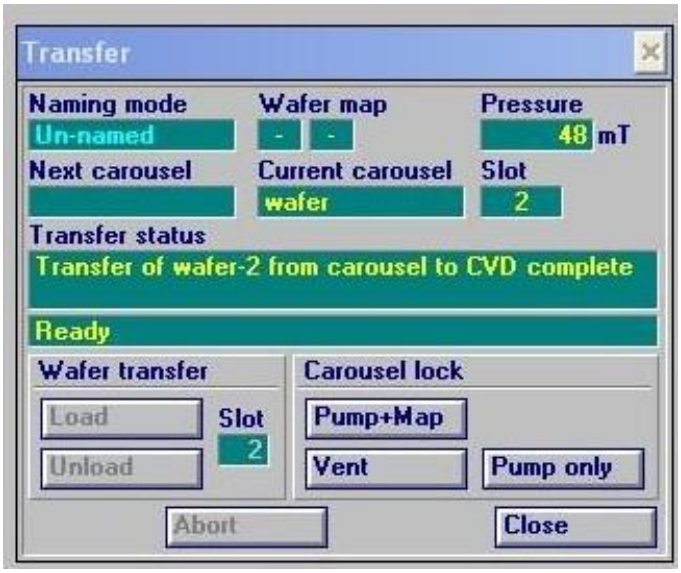
Main Software Window



The main software screen contains a number of dedicated windows for controlling and monitoring the system operation. On the upper left is the **CVD View** – this displays the current status of the chamber and all the subsystems associated with it – gas flows, RF power, temperatures and pressures. The **Plan View** in the upper center will allow the user to monitor wafer movement within the system and displays the process status of each wafer, i.e., an unprocessed wafer is gray, in process is maroon and finished wafer is green. The **Side View** window displays the pressures in the loadlock and the process chamber. The **Process Control** window displays the recipe parameters and feedback readings during the deposition process. The **Sequencer** window allows the

users to run single or multiple wafers processes. The **Transfer** window is used to manually load or unload wafers from the process chamber and controls venting and pumping down the loadlock.

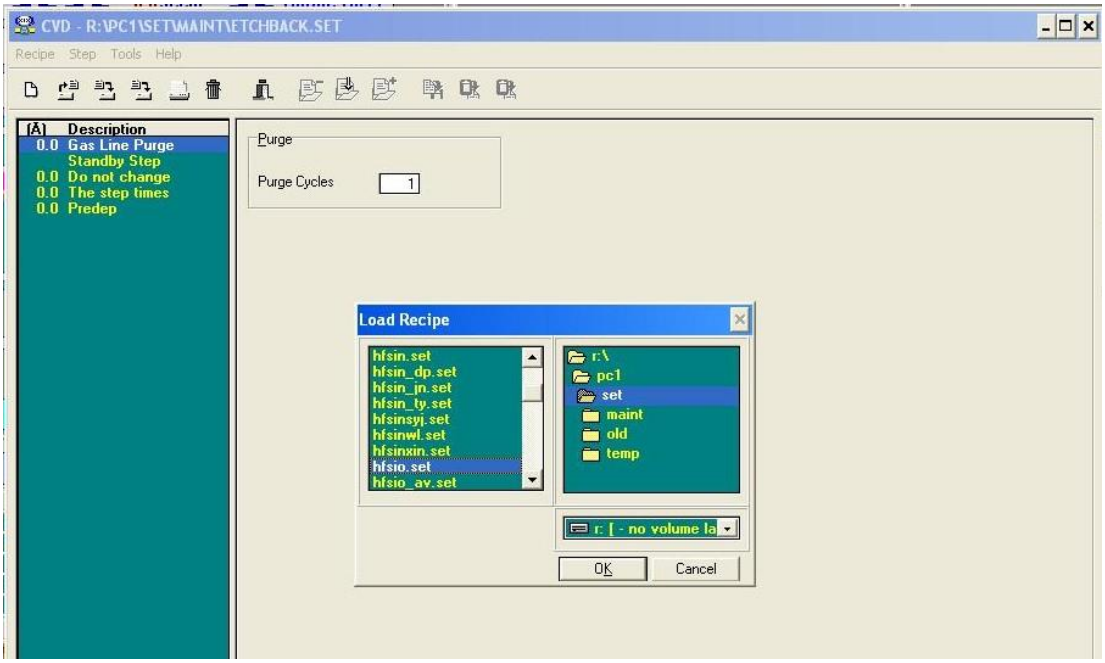
Loading a Sample:



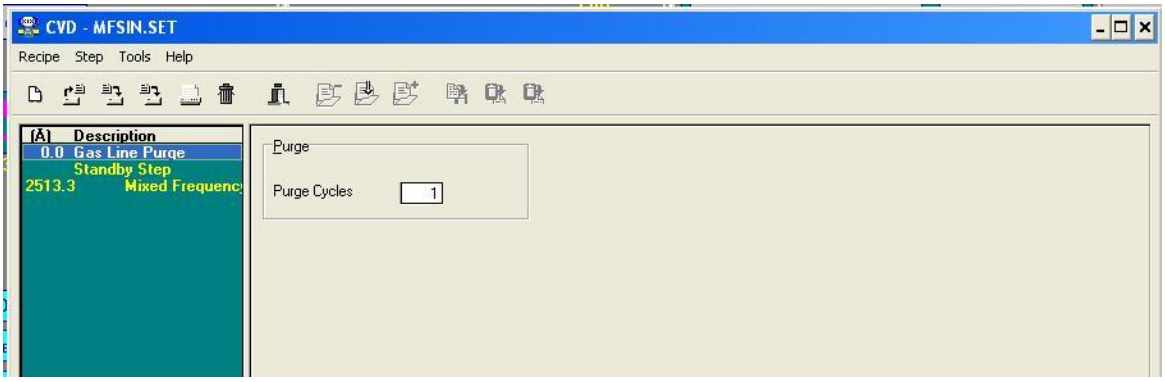
1. Reserve and engage the SAMCO on CORAL, CORAL disables the system so you need to engage the tool in order to process a wafer. Verify that the system is not in use.
2. Click on the **Vent** button on the **Transfer** window – this will cycle purge the loadlock and pressurize with Nitrogen until the chamber reaches atmosphere. The loadlock lid will then pop open.
3. Place your wafer in one of the 2 available slots on the load arm. 4" wafers or smaller pieces have to be placed on one of the provided Aluminium carrier chucks.
4. Close and latch the loadlock lid and click on the **Pump + Map** button in the **Transfer** window. This will pump the chamber down to base pressure (80mT) and rotate the load arm in order to locate the sample using a laser.

Editing a Recipe:

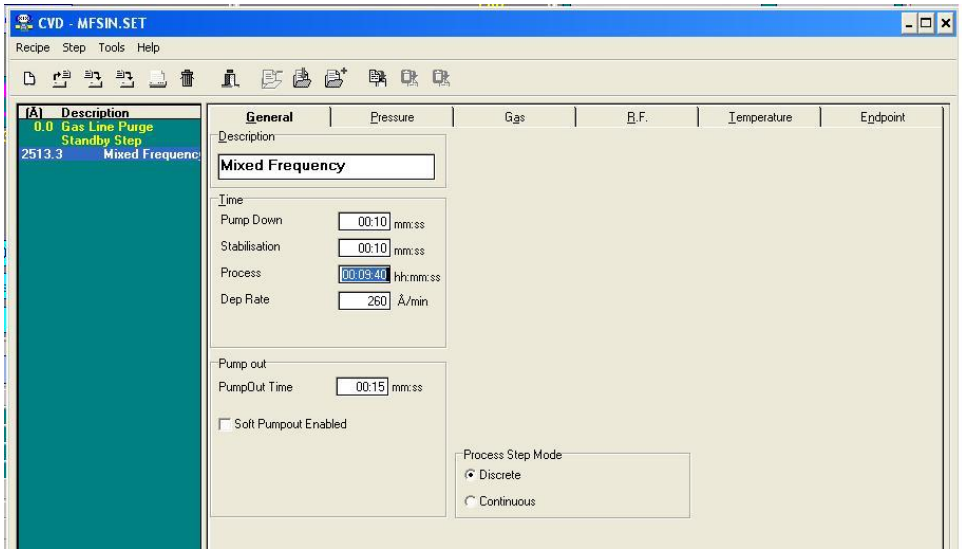
1. Click on the **Recipe** button in the **Process Control** window, this will open the **Recipe Editor**.
2. Click on the **Open** button to peruse the recipe list and select the recipe you would like to run.



3. The left side of the editor lists the steps contained in the recipe, and the rest of the screen details each steps parameters. In general, each recipe contains just three steps: a standard first step for purging the gas manifold, a second step for setting up pump/purge times, and the third step is the main process step.



4. To achieve the desired film thickness, users will adjust the deposition time: click on the Main Process Step and then adjust the **Process Time** parameter. If the **Dep Rate** box has been filled out, the process step name on the left will automatically update to indicate a calculated film thickness.
Do not change any other recipe setpoints – custom recipes can be set up with Staff help.

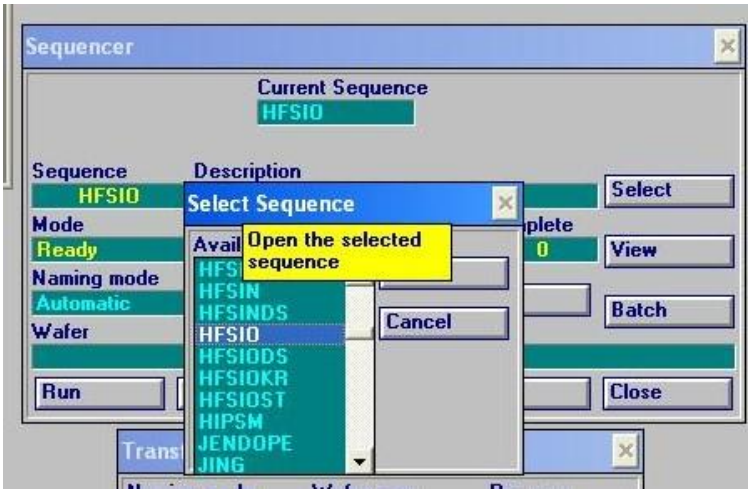


5. Save the recipe change and exit the **Recipe Editor**.

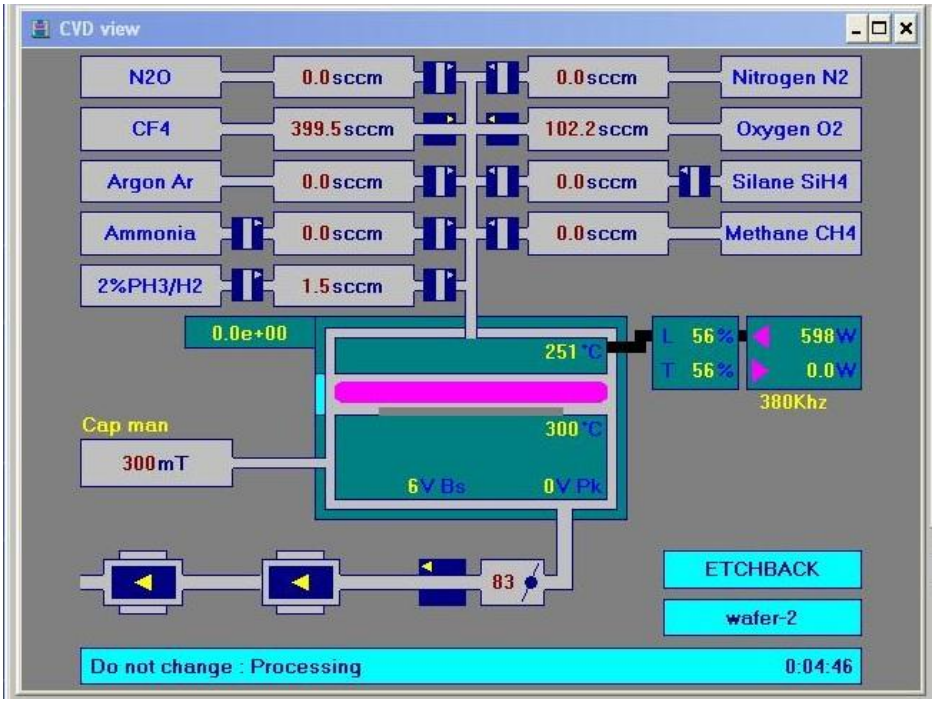
Processing the Sample:

1. Samples are processed using the **Sequencer** – this will automatically load the samples into the chamber, run the recipe(s) selected, unload the sample, and then vent the loadlock so the samples may be removed. Sequences can also be configured to run a second sample if needed.

2. Click on the **Select** button on the **Sequencer** window and choose the desired sequence from the list, the sequence typically has the same name as the film it deposits.
3. Check that the **Batch** size is correctly set to the number of samples being processed. If incorrect it may be changed in the **Sequence Editor** accessed using the **View** button.



4. Click on the **Run** button to begin processing. When processing is complete, the samples will be returned to the loadlock which will then automatically vent to atmosphere.
5. Remove your samples from the loadlock, taking care not to touch the wafer holder if it was used to carry the pieces – it will be approximately 300°C when removed from the chamber.
6. Pump down the Loadlock after samples are removed with the **Pump Only** button on the **Transfer** window.



Common Issues

If the chamber showerhead is not at process temperature, there may be a problem with the lid heater Heat Exchanger – Shut Down the system in Coral and Staff will resolve it.