

STS # 1 SOP

INTRODUCTION:

The ST Systems Multiplex ICP tool is a Deep Reactive Ion Etch (DRIE) tool. It provides high aspect ratio etching and deep/through wafer anisotropic etching capabilities. The tool uses two independent 13.56MHz Radio Frequency (RF) power supplies - a 1000W supply for a single-turn coil around the etch chamber and a 300W supply connected to the wafer electrode to vary the RF bias potential of the wafer with respect to the plasma. The efficient inductive power coupling of the coil to the plasma allows high density plasmas to be maintained. The tool uses the Bosch process of time multiplexed deep etching (TMDE) to achieve high aspect ratio etches. This process utilises an etch cycle flowing only SF₆ and then switching to a sidewall passivation cycle using only C₄F₈. During the subsequent etch cycle, the passivating film is preferentially removed from the bottom of the trenches using ion bombardment.

SAFETY:

Due to the toxic nature of the process gases, the supply cylinders are turned on and off by qualified technical staff only. All tank changes are performed by qualified technical staff only.

Do not try to defeat any interlock on the system. Keep your hands away from all moving parts and be sure that all covers are in place when you are processing. 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.

OPERATING PROCEDURE:

NOTE: It is mandatory to reserve the system prior to use and to ENGAGE MACHINE prior to starting your process in CORAL.

The loadlock computer is no longer operational, so loading and unloading a wafer has become a manual procedure that must be carried out in specified steps or the wafer and the system will be damaged.

VENT

Turn off **Loadlock Isolation Valve**

*Make sure **Chamber Gate Open/Close** valve is off*

Turn on **Loadlock Vent**

Remove wafer from robot arm

Turn off **Loadlock Vent**

PUMP

Close loadlock lid

Turn on **Loadlock Isolation Valve**

Wait 30 seconds, or until **Chamber Gate Interlock** LED is green

LOAD

Make sure loadlock is under vacuum

Turn on **Chamber Gate Open/Close** valve

Switch load arm control to Load, drive arm into chamber and adjust to correct position

Turn on **Slice Lift** valve

Switch load arm control to Unload

Turn off **Slice Lift** valve

Turn on **Electrode Clamp** valve

Turn off **Chamber Gate Open/Close** valve

PROCESSING THE WAFER:

At the bottom right of the screen are several options:

F1 - Begin Etch	<i>Begins running currently loaded recipe</i>
F2 - Load New Process	<i>Load a new recipe</i>
F3 - Load/Unload	<i>Return to Loadlock Control screen</i>
F4 - Shut Down	<i>Exits the software</i>

If the software has been exited by accident, it will return to a DOS prompt screen, The software may be restarted by typing **process** and pressing return.

At the bottom left of the screen are two more options:

F6 - Main Menu	<i>Text screen for entering DOS commands</i>
F7 - Mimic	<i>Process Monitor screen</i>

Before beginning the etch, the correct recipe must be loaded – Press **F2** to access the recipe list - use the cursor keys to highlight the desired recipe, then press enter to load it. The screen will return to the **Process Parameters** screen and the chamber will go through a pump routine to reach base pressure. When the screen says *Pumping to Aux. Vacuum Gauge Trip Point*, press the **EMIS** button on the front of the Ion Gauge control box at the front of the system.

Once the recipe has been loaded a message will appear on the bottom right of the screen and the **F1** key can be pressed to begin the process. If you are going to adjust the recipe time or any other process parameters, follow this procedure carefully:

- During the 'Gas Stabilisation' step, press the **F2** key to **Hold** the process.
- Use the arrow keys to move to the parameter being adjusted – enter the new setting and press Enter.
- If you are adjusting the time, use the format *00:00:00*, be sure to insert the colons and press Enter when time is correct.
- Press **F2** again to resume the process.

If the software reports an RF fault during the process please check the Helium flow on the HBC1 module on the front of the tool – a fault LED will be lit if the Helium flow is out of range. The position of the wafer on the platen should be checked – if it appears correct then the wafer must be removed from the system and the backside checked for cleanliness.

When the process has completed, the message *'Process x ended OK'* will appear on the lower right of the screen. The wafer must be removed from the chamber as the backside Helium will remain on until the wafer is returned to the loadlock. Proceed with the Unload method.

UNLOAD

Make sure loadlock is under vacuum

Turn on **Chamber Gate Open/Close** valve

Turn off **Electrode Clamp** valve

Turn on **Slice Lift** valve

Switch load arm control to Load and drive arm into chamber, adjust to correct position

Turn off **Slice Lift** valve

Switch load arm control to Unload

Turn off **Chamber Gate Open/Close** valve

VENT

Turn off **Loadlock Isolation Valve**

*Make sure the **Chamber Gate Open/Close** valve is off*

Turn on **Loadlock Vent**

Remove wafer from robot arm

Turn off **Loadlock Vent**

Remove Wafer from loadlock and pump the load back down.

PUMP

Close loadlock lid

Turn on **Loadlock Isolation Valve**