

AME 5000

STANDARD OPERATING PROCEDURE

CORAL

Name: AME5000

Model

Number: P5000

Location: ICL

What it does: Si/nitride dry etcher

Introduction: The AME 5000 is a Radio Frequency (RF) magnetically coupled etching system. This system is configured with two etch chambers. The chamber designations are chamber A and chamber B. Chamber A is dedicated to etching Thermal Oxide, Low Temperature Oxide (LTO) and Boron Phosphorus Silicate Glass (BPSG) and Silicon Nitride. The gas chemistries supplied to chamber A are Oxygen (O_2), Halocarbon 14 (CF_4) Halocarbon 23 (CHF_3). Chamber B is primarily used for Silicon etching. However, Chamber B is used as a backup for the nitride etching with a SF_6 nitride recipe. Chamber B is capable of etching Silicon trench, UN-doped Polysilicon, Doped Polysilicon and Silicon Nitride. Gas chemistries supplied to chamber B are Chlorine (Cl_2), Hydrogen Bromide (HBr), Oxygen (O_2), Sulfur Hexafluoride (SF_6), and Nitrogen Trifluoride (NF_3).

The system is completely controlled by a computer, and wafers are transported via robotic arm movement. The samples are mechanically clamped onto the chamber electrode to prevent movement during process. Helium backside cooling is provided for the purpose of keeping the wafer at a uniform temperature and of preventing photoresist from burning.

Two loading zones are supplied on the system, which allows the wafers to be loaded in a cassette to cassette mode and places the wafer in the exact cassette slot after processing is completed. The system can be run in the manual or automatic mode. The process program can be written so wafer processing can be performed sequentially.

There is a load lock system which enables you to transfer wafer from the load lock in parts of eight wafers, and perform all processing and load lock to chamber transfer without breaking vacuum. The cassette to chamber transfer is accomplished in the following manner.

For a 25-wafer lot process,

- a. The cassette is placed onto the loading platform.
- b. The robotic arm removes 8 wafers from the cassette on the loading platform and places them on a load lock storage elevator.
- c. From the load lock storage arm, they are transferred to a specified chamber, chamber A or chamber B.
- d. After the process is performed on the first wafer, it is then returned to the load lock elevator and the second wafer is taken into the chamber.
- e. The wafers are removed from and replaced back into the same slot.
- f. When all the wafers are processed, the load lock comes up to atmosphere and the first eight wafers are returned to the original cassette slot and the next eight wafer go through the same cycle until all the wafers are processed.

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 with the operation of the system, contact the technical staff in charge of the system and

do not try repairs on your own.

Procedure:NOTE: It is MANDATORY to RESERVE the system prior to use. It is mandatory to ENGAGE MACHINE prior to starting your process in CORAL.

1. If operating in manual mode, one must perform a HOME ALL ROBOTS. If operating in the automatic mode, the system will perform the HOME ALL ROBOTS prior to loading wafers.
2. Select the process RECIPE icon. With the lite pen click onto the recipe icon at the top of the screen. This page contains all the recipes applicable on the system.
3. Change the time parameter in the recipe according to the thickness of the material to be etched. This system does not have endpoint detection. NOTE: Chamber A for Oxide and Nitride. Chamber B for Silicon, Polysilicon and Nitride.
4. Click onto the CONTROL icon at the top of the screen. The recipe that is being used must appear in the proper chamber. Look at the chamber designation near the bottom of the screen, click on either chamber A or chamber B. A window will appear in the center of the screen, with the lite pen, select the desired recipe. The recipe will be automatically loaded for the selected process chamber.

Processing wafers in the AUTOMATIC mode:

1. Click on WAFER with the lite pen. Click on MONITOR WAFER.
2. When the window appears on the screen, click on SHUTTLE CASSETTE to move the cassettes to the proper place on the cassette loading station.
3. Place the cassette containing the wafers to be processed onto the loading station and be sure that the locating pins on the cassette align with the locating pins on the system. If they are not aligned, the system will alarm and retry the alignment.
4. On the bottom of the same screen, select clamp cassette. CLAMP A or CLAMP B, whichever applies.
5. Click on CONTROL located on the top of the screen. When the window appears, click on the MANUAL. A small screen will appear below the MANUAL prompt. Click on the AUTOMATIC prompt with the lite pen.
6. Click on the WAFER prompt. When the selection window appears, click on RUN (GO) BUTTON. The other option is to press the START button on the front of the system near the cassette load shuttle. The shuttle cassette door will close. NOTE: The first 8 wafers will be transferred onto the load lock elevator and into the process chamber. After these wafers are processed, they will be placed back into the cassette in the order in which they were removed. Then the next wafers will be transferred onto the storage elevator for processing. This system will process a maximum of 25 wafers.
7. After all the wafers have been processed, press the unload push bottom on the front of the system and the shuttle cassette door will open.
8. Click on WAFER (if not already on the proper screen). When the window appears, click on MONITOR WAFER.
9. Click on RELEASE A or RELEASE B, whichever applies. Remove the cassette and wafers.
10. DISENGAGE MACHINE in CORAL.

Processing wafers in the MANUAL mode:

For small wafer lots, this procedure may be a better option.

1. Click on WAFER with the lite pen. Click on CONTROL HANDLER. When window changes, click on HOME ALL ROBOT AXIS. A window will appear. Click on HOME ALL ROBOT AXIS. This cycle should take a few minutes. It is important to perform this robotic function. If not, the robot may lose its location and will not fully transfer wafers.
2. Click on WAFER with the lite pen. Click on MONITOR WAFER.
3. When the window appears on the screen, click on SHUTTLE CASSETTE to move the cassette to the proper place on the cassette loading station.
4. Place the cassette containing the wafers to be processed on to the loading station, be sure that the locating pins on the cassette align with the locating pins on the system. If they do not align, the system will alarm and retry the alignment.
5. At the bottom of the same screen, select clamp cassette. CLAMP A or CLAMP B, whichever cassette is in place.
6. Click on CONTROL located on the top of the screen. When the window appears, it should be in MANUAL at SYSTEM STATE. If the system is not in MANUAL, click on the AUTOMATIC. When a small window will appear, click on MANUAL. Now the system is in the MANUAL mode.
7. Click on WAFER. When a window appears, click on MONITOR WAFER. This gives a graphic display
8. Place the cassette on the shuttle cassette loading station. Be sure the cassette alignment locations pins are aligned. If the cassette is not properly aligned, the system will alarm when clamping the cassette.
9. On the same page, click on CLAMP A or CLAMP B. If system goes into an alarm, click on RELEASE and re-align the cassette and CLAMP the cassette again.
10. Notice that, when the wafers are clamped, the graphics will display a series of dotted line (vertically) that represents 25 wafers in a cassette. If you choose to you may delete as many slots as you want. Click on the first wafer you want to delete. A window will appear. Click on the prompt START DELETE RANGE. Click on the last wafer for deletion and click on END OF DELETE RANGE. All wafer slots in between the first and the last wafer slot depicted on the screen will be deleted.
11. Now you are ready to transport wafer to and from the load station cassette to the etch chamber. With the lite pen, click on the wafer you want to transport. A window will appear on the screen. Click on SOURCE FOR MOVE. Click on the dash line depicted in the chamber you are processing in. When a window comes up on the screen, click on DESTINATION FOR MOVE. This will transport the wafer to the chamber.
12. Once the wafer is loaded into the etch chamber, select CONTROL icon. Click on the etch chamber of your choice and verify that your recipe has been down loaded. If it has not been down loaded, click on the chamber and select the recipe from the list that appears on the screen. Select the chamber by clicking (PROCESS IN CHAMBER) CHAMBER A or CHAMBER B.
13. On the same page opposite the selected chamber, click on the RUN prompt.
CAUTION: Do not strike plasma in any chamber without a wafer present. If a wafer is not present and a plasma is struck, it will burn the wafer lifter tips and the seals for helium backside cooling.

14. When the etch is complete, click on the chamber where the wafer is. When a window appears on the screen, select the prompt SOURCE FOR MOVE. Click on the cassette wafer slot you want to place the wafer. When a window appears, click on destination for move. This will transfer the wafer back into the cassette.
15. Click on RELEASE A or RELEASE B whichever applies.
16. Remove the cassette and wafers.
17. When through with processing, DISENGAGE MACHINE in CORAL.

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