

## Standard Operating Procedure: Vapor HF Etcher

### Contents

Hardware Description and Principle of Operation .....	1
Procedure.....	1
Emergency Stop .....	3
Allowed Activities.....	3
Disallowed Activities .....	3
What to watch out for during operation .....	3
Common Troubleshooting Tips.....	4
When to call staff? .....	4
Badger Criteria .....	4

# Standard Operating Procedure: Vapor HF Etcher

## Hardware Description and Principle of Operation

### **SPTS Primaxx Vapor HF Etcher**

The SPTS Vapor Hydrofluoric Acid Etcher is used primarily for isotropic etching of all types of SiO<sub>2</sub> and offers a safer alternative to liquid-HF processes. Furthermore, the dry-HF process eliminates the stiction problems often encountered in releasing SOI-MEMS devices.

### Material Requirements

Equipment: substrate, tweezers and hotplate (250°C)

Personal Protective Equipment: nitrile gloves and safety glasses



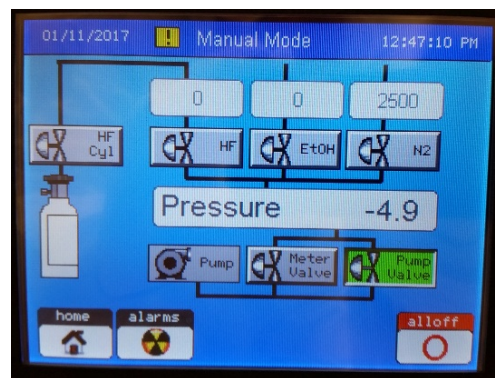
## Procedure

Estimated Time: >30 minutes

**Warning:** No resists or polymers are allowed in the chamber as these will contaminate the chamber with polymer. Recommended masking materials are alumina, aluminum, silicon carbide, or silicon.

### Sample Preparation

1. Bake wafer and dry at 250°C for 2 minutes to drive off any off-gassed polymer from storage container.
  - a. Step may be skipped if the wafer has not been stored for more than 2 hours since its last processing step.
  - b. This step can be replaced by an O<sub>2</sub> descum plasma.
2. Check the exhaust gauge: 0.4.
3. Tool screen should be in Manual Mode with the pump valve open to keep the chamber at vacuum. Press **Pump Valve** to close the pump valve.
4. Press **Home** to go to the home screen.

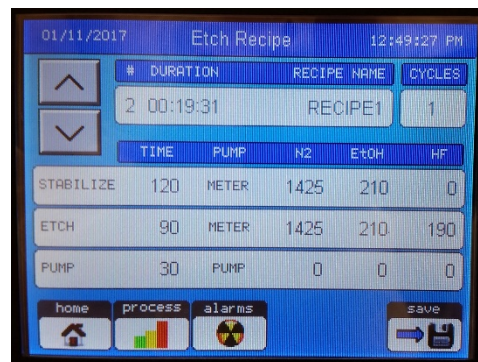


### Select Recipe

1. At the home screen, press **Recipe**.

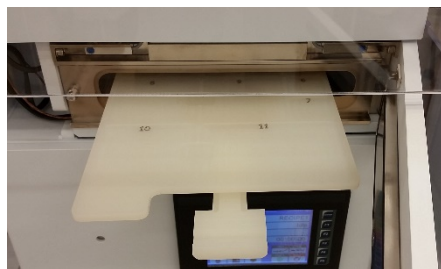
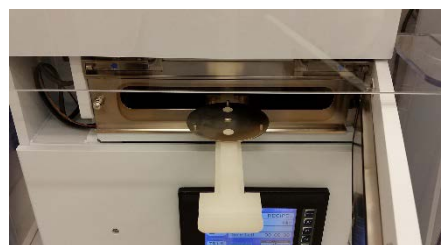
## Standard Operating Procedure: Vapor HF Etcher

- Use the arrow keys to switch to the recipe you want to use. Use only Recipes #1-5. You cannot set up your own recipe and you are only allowed to change the etch time and number of cycles of the recipe you use.
- To change a value, select the number of cycles or etch time, enter a new value, and press **Enter**. Set the etch time and number of cycles to achieve your desired etch depth using the etch rate for the recipe.
- Press **Save**.



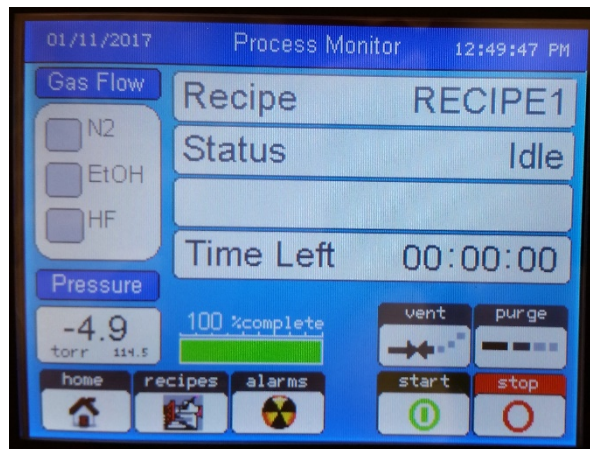
### Load Sample

- Press **Process** to go to the process screen.
- Press **Vent** to begin venting the chamber. Wait for the preset 1 minute and 10 seconds for the chamber to vent and then open the door. As you open the door from the left side, take care to hold the door up, as the single hinge on the right side is very fragile.
- Pull out the wafer chuck.
  - If you are using pieces, leave the sample holder in place and put your pieces in the slots corresponding to their size.
  - If you are using a whole wafer, remove the sample holder and place it on top of the tool. Place your wafer on the three pins.
- Push the wafer chuck back into the chamber and close the door.



### Start Process

- Press **Start** to start your process.
- As you press start, press and hold the middle of the chamber door until the chamber begins to pump down.
- Wait for the process to finish. The total process time will be 19 minutes plus your etch time.
- At 00:01:10, "Time Left" will stop and the vent button will flash blue.



### Unload Sample

- Press **Vent** to finish venting the chamber.
- When the chamber is vented, open the chamber and remove your sample. If you removed the sample holder in order to process a whole wafer, replace it in the chamber.

# Standard Operating Procedure: Vapor HF Etcher

## Shutdown

1. Press **Home** to return to the home screen.
2. Press **Manual** to get to the Manual Mode screen.
3. Press **Pump Valve** to begin pumping the chamber.

## Emergency Stop

### Non-Critical

1. Press **Stop**.
2. If HF is in the chamber, go to the alarm screen and press **System Alarms**, press **ACK**, then press **ESC** to clear alarm.
3. Press **Purge**.
4. Press **Vent**.



### Critical

- In the case where the tool is malfunctioning and may cause harm to users, press the red EMO button to cut off all power to the tool.

## Allowed Activities

- If users wish to develop a recipe for use in the tool, they can consult with SPTS to get the parameters they require and then with staff to set it up on the tool.

## Disallowed Activities

- No resists or polymers allowed in the chamber as these will contaminate the chamber with polymer.
- Users are not allowed to edit the recipes.

## What to watch out for during operation

- Be sure the pieces chuck is placed back inside the chamber when finished running the tool.

## Standard Operating Procedure: Vapor HF Etcher

- If HF is detected in the chamber, try running a purge of the chamber. It may require a couple of purges to clear the alarm.

### Common Troubleshooting Tips

- If etching pieces in the tool, it may be helpful to try placing the piece in different positions on the pieces chuck to determine how placement affects the etch rate or uniformity.

### When to call staff?

- If the pump has shutdown.
- If any alarm is active and cannot be cleared by user action.

### Badger Criteria

#### Report Problem:

- If any alarm is active and cannot be cleared by user action.

#### Shutdown:

- If the pump has shutdown.

### Revision History: