

Approved by:

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Process Engineer

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Equipment Engineer

1 SCOPE

The purpose of this document is to detail the use of the CVC Bell Jar Evaporator. All users are expected to have read and understood this document. It is not a substitute for hands-on training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Material Safety Data Sheets for evaporative metals, nitrogen and pump fluids.
- Appropriate Tool Manuals Filed Under CVC Evaporator

3 DEFINITIONS

n/a

4 TOOLS AND MATERIALS

4.1 General Description

The CVC Evaporator is a thermal evaporation bell jar vacuum system. It has an oil-sealed rotary roughing pump and a cryogenic high vacuum pump. Typical source materials are aluminum and gold pellets.

5 SAFETY PRECAUTIONS

- ### **5.1 Wear proper eyewear and face shield for protection from bell jar failure (implosion).**

6 INITIAL STATE CHECK

6.1 Service Chase 2725 Setup

- 6.1.1 Turn on the vent gas by turning the green **CVC EVAPORATOR** valve on the **NITROGEN MANIFOLD – 2725** to the **ON** position. The panel is located on service chase 2725 wall. Verify that the gauge reads 15psi. Contact a technician if it does not.

6.2 Equipment Setup

- 6.2.1 Ensure **Granville Philips Controller** is **ON**. [Panel #3]
6.2.2 Turn **ROUGHING PUMP** switch to the **ON** position. [Panel #1]

7 OPERATION

7.1 Chamber Venting

- 7.1.1 Press <**STOP**> (panel #2)
7.1.2 Press <**VENT**> (panel #2)
7.1.3 Carefully raise the bell jar. **WARNING - DO NOT LIFT BEYOND THE TOP OF THE GUIDE POSTS!**
7.1.4 Press <**STOP**> (panel #2) to close the VENT valve.

7.2 Substrate Loading (use gloves and tweezers)

- 7.2.1 Inspect all filaments to see that they are physically sound and do not contain any metal from previous runs. **DO NOT UNSCREW THE BACK BOLTS ALL THE WAY**. Just unscrew them enough to put the filament under the washers and then tighten them back down.
7.2.2 Load **TWO** filaments, if possible, with the desired amount of evaporant. Rotate the **BLACK FILAMENT SELECTOR WHEEL CLOCKWISE** to advance to the next position. The filament holder assembly rotates in one direction only.
7.2.3 Position the first filament against the electrical contacts. Listen for the click then back up to ensure the right position.
7.2.4 Remove the coated microscope slide from the front shield assembly. Install a new slide in its place.
7.2.5 Check to see that the rear mirror is in the position to view the filament's reflected image.
7.2.6 Place the shutter in the closed position so the filament/evaporant is covered.
7.2.7 Remove the wafer platen and **load wafers device side down**.
7.2.8 Replace the loaded wafer platen assembly.

7.3 Inficon Film Thickness Monitor



7.3.1 Unit should be powered on. If not press <ON>

7.3.2 Depending on the metal you are going to use you will need to enter your Density

and

Z-Ratio into the unit. This is found in the Inficon Material Evaporation Guide.

7.3.3 Press the <PROG> button to get into programming mode.

7.3.4 Press <E> or <C> to scroll either up or down in the menu.

7.3.5 Stop at Density and enter what is on the Metal Evaporation Guide for the specific metal you are using then press <E>

7.3.6 Enter the Z-Ratio from the Metal Evaporation Guide for the specific metal you are using then press <E>

7.3.7 Depending on the planetary you are using you will need to input the Tooling Factor. This can be found on the panel next to the controller.

7.3.8 Input the Tooling Factor then press <E>

7.3.9 Input your desired thickness and press <E>

7.3.10 Press <PROG>

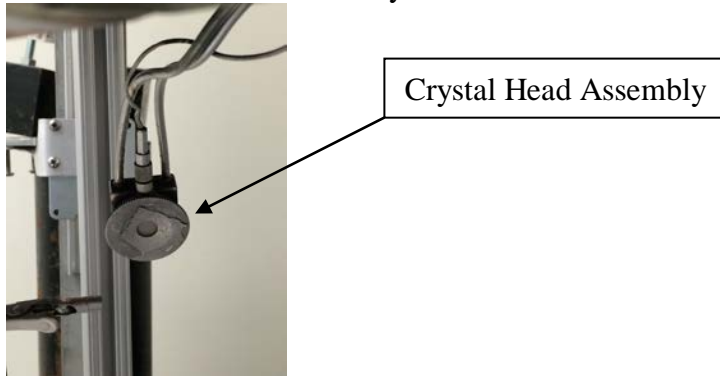
7.3.11 Press <1> to display current percentage of crystal life.

If <= 15% then crystal needs to be changed.

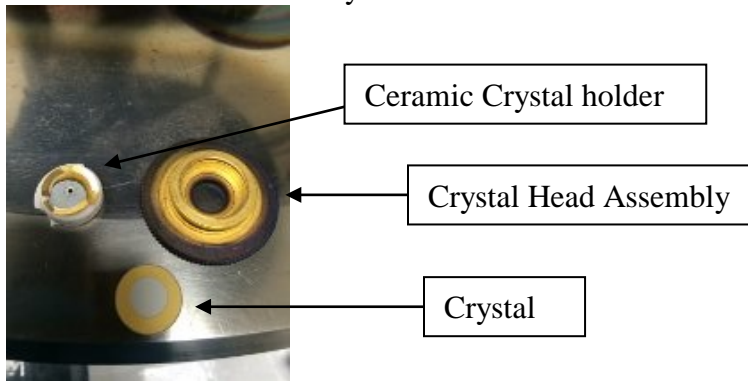
If crystal doesn't need to be changed go to section 7.4 otherwise continue to 7.3.12

7.3.12 Turn off Inficon Film Thickness Monitor by pressing <ON>

7.3.13 Remove head assembly from unit inside vacuum chamber



7.3.14 Disassemble head assembly by removing ceramic insert and then removing crystal from head assembly.



7.3.15 Replace Crystal into Head Assembly then re-assemble ceramic insert into Head Assembly.

7.3.16 Install Head Assembly back into Unit in Vacuum chamber.

7.3.17 Press <ON> to turn Inficon Film Thickness monitor on.

7.3.18 Press <1> and read display of percentage of crystal. It should be at zero.

7.4 Chamber Pumpdown

7.4.1 Inspect the bell jar seal and base plate for metal flakes.

7.4.2 If necessary, wipe down gaskets and sealing surface with IPA and an alpha wipe.

7.4.3 Carefully lower the bell jar until it contacts the base plate. The **BELL JAR DOWN** LED will illuminate. (panel #2)

7.4.4 Press <START> (panel #2)


7.5 Evaporation

DO NOT SWIPE OUT WHILE YOUR WAFERS ARE IN THE TOOL

- 7.5.1 Unit needs to get to a base pressure of 9.0×10^{-6} before deposition can occur. <HI VOLTAGE READY> will display on panel #2 when evaporation is available.
- 7.5.2 Ensure the **BLACK VARIAC** knob is set to **ZERO**.
- 7.5.3 Increase the VARIAC to evaporate slowly. Watch for the pellet to melt. The filament brightness will dim noticeably. **Wait about 5 seconds after the pellet melts before opening the shutter.** This allows surface contaminants on the pellet to burn off onto the shutter.
- 7.5.4 Evaporate to completion by observing the reflected image of the filament/evaporant.
- 7.5.5 Annotate the film thickness from the Inficon Film Thickness Monitor
- 7.5.6 Turn the **VARIAC** to zero.
- 7.5.7 If additional evaporation is needed rotate the next filament into the evaporation position and go back to Step 2 of this section.
- 7.5.8 If no more evaporation is needed
 - 7.4.7.1 Press <STOP> (panel #2)
 - 7.4.7.2 Press <VENT> (panel #2)
 - 7.4.7.3 Carefully raise the bell jar
 - 7.4.7.4 Press <STOP> (panel #2)
 - 7.5.9 Unload the chamber.
- 7.5.10 If desired, reload the chamber and repeat procedure.

7.6 Shut Down

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- 7.6.1 Inspect the bell jar seal and base plate for metal flakes.
- 7.6.2 If necessary, wipe down gaskets and sealing surface with IPA and an alpha wipe.
 - 7.5.3 Carefully lower the bell jar until it contacts the base plate. The **BELL JAR DOWN** LED will illuminate (panel #2)
- 7.6.4 Press <STOP> (panel #2)
- 7.6.5 Press <START> (panel #2)
- 7.6.6  **TURN OFF THE ROUGH PUMP** by placing the **ROUGHING PUMP** switch to the **OFF** position. [Panel #1]
- 7.6.7 Turn OFF the vent nitrogen by turning **OFF** the green **CVC EVAPORATOR** valve on the NITROGEN MANIFOLD- 2725 located in service chase 2725.

R·I·T

Title: CVC Evaporator

Semiconductor & Microsystems**Fabrication Laboratory****Revision: G****Rev Date: 05/05/2016****8 ATTACHMENTS****REVISION RECORD**

Summary of Changes	Originator	Rev/Date
Original Issue	Battaglia	A-12/23/02
Updated format, w/ new N2 instructions	S. Blondell	B-09/15/04
Updated format, added instructions to close vent	O'Brien	C-05/01/06
Updated Section 7 from Hi Vac #1 to Hi Vac #2	S. Blondell	D-08/05/08
Update format, new controller installed to run vacuum system	RLBattaglia	E-01/15/09
New Inficon Film Thickness Monitor	RLBataglia	F-02/17/2015
Update filament change and eliminate ASML chiller reference	R L Battaglia	G-05/05/2016