

ATOMIC LAYER DEPOSITION (ALD) SOP

BENEQ TFS-200

Revised April 2020



IMPORTANT INFO

<u>Appropriate Substrates</u>	<u>Non-appropriate Substrates</u>
Silicon Quartz Borosilicate Glass Soda Lime Glass	Polymers Wet samples (Always better to dry the samples properly) Anything with melting points or ignition points below 250°C Plastic Non-encapsulated particles

Start-Up, Loading Substrates & Running Recipes

1. Log into your FOM account to turn on access to the ALD.
2. In the chase behind the ALD turn **ON** the following utilities:
 - a. Nitrogen N₂ on the wall.
 - b. Main Power to **ON** position on the control cabinet and press the blue reset button.
 - c. Open both water to the flow lines to the roughing pump.
 - d. Check the water level of the chiller and refill with DI water if needed. Turn **ON** the chiller rocker switch and press the power button.
3. Login onto the computer and press the **LOGIN** button

Login: **beneq** <enter>

Password: **beneq** <enter>

4. Go to the **ALARM** window and press **ALARM ACK** to clear the alarms.
5. Go to the **CONFIGURATION** window and press **DRY PUMP** to turn **ON** the pump.
6. Go to the **CONTROL** window and press on **PUMPDOWN** and **YES** when prompted to close the vacuum chamber door. This will pump down the main processing chamber.

NOTE: Skip Steps 7 through 19 if you are loading Process Chamber directly

7. Make sure the load lock is pulled back to the load position by manually pulling the collar all the way to the right.
8. Go to the **LOAD LOCK window** and make sure the gate valve is closed by clicking on **GV CLOSE** and turning it green.
9. Press **LOAD LOCK VENT** and continue by pressing **YES** and wait until the tool is in an **IDLE state**.
10. Open the red lever and load lock. Load your **clean substrate** onto the substrate holder plate.
11. Close the load lock and red lever.
12. Click on **PUMP DOWN LOAD LOCK** and press **YES** to continue.
13. Wait until prompted to open the gate valve and press **GV OPEN**. It will turn it green and open the gate valve.
14. Push the collar of the substrate holder into the processing chamber. **NOTE:** The collar has a star written on top of it.
15. Push the **SUBSTRATE LIFTER** button on the tool to lift the substrate from the transfer arm.
16. Pull the collar out of the processing chamber to its home position.
17. Close the gate valve by pressing **GV CLOSE**.
18. Push the **SUBSTRATE LIFTER** button to lower the substrate into the holder lifter.
19. Push the **HOLDER LIFTER** button on the tool to lift the substrate into position for processing.

Manually Loading the Processing Chamber

- a. Go to the **CONTROL** window. If the set point of the reactor is correct then press **HEATING** and it will turn green.
- b. If using a hot source turn on **HEATING** in a similar manner for the selected Hot Source.
- c. In the **CONTROL** window, select **VENT** to vent the processing chamber and to load a wafer or sample.
- d. When vented the tool will say **IDLE** at the top part of the screen. Open the primary lid of the processing Chamber and manually remove the secondary lid using the lid holder.
- e. Make sure the substrate chuck in the upper most position. If not depress **HOLDER LIFTER** on the tool.
- f. Load your sample in the processing chamber.
- g. Place the secondary lid on the processing chamber with the lid holder tool.
- h. Press **PUMP DOWN** on the control window and press **YES** when prompted to close the chamber door. Go to step 19.

Running a Recipe

20. Go to the **CONTROL** window and select your recipe from the drop down box located above **RECIPE COMPILE AND DOWNLOAD**.
21. Click on **RECIPE COMPILE AND DOWNLOAD** to load the desired recipe into the tool's memory.
22. Click on **START BATCH** and **START BATCH** again in the pop-up box.
23. If any **HOT SOURCES** need to be heated, activate the **HEATING** button to allow the source to slowly reach temperature.
24. Note your recipe and operating parameters in the log book.
25. Most recipes will allow time for the **REACTOR** and any **HOT SOURCES** to reach their operating temperatures to ensure a steady temperature, press **YES** to continue once these have been achieved.
26. After a few minutes a pop-up window will request you to open any precursors necessary for the recipe, open the cabinet under the machine and turn only the **RIGHT** valve to open for the necessary precursors and click **YES** on the pop-up window.
27. The recipe will start and progress can be viewed by activating **LOOP COUNTER** on the **CONTROL** panel.
28. When the recipe finishes it will request you to close any open precursors and to click **YES** to verify.
29. Unloading your samples from the processing chamber can begin once the **IDLE** icon appears at the top of the screen.

Unloading Your Substrate and Shutdown

30. When the recipe is finished click or press **HOLDER LIFTER** to lower the substrate in the processing chamber.
31. Click or press **SUBSTRATE LIFTER** to raise the substrate in the processing chamber.
32. Go to the **LOADLOCK** window and open the gate valve with **GV OPEN**.
33. Push the transfer arm collar into the processing chamber.
34. Click or press the **SUBSTRATE LIFTER** to lower the substrate onto the transfer arm.
35. Pull the transfer arm collar out of the processing chamber.
36. Go to the **LOADLOCK** window and close the gate valve by clicking on **GV CLOSE** and turning it green.
37. Press **LOAD LOCK VENT** and continue by pressing **YES**.
38. Open the red lever and load lock door. Remove your processed substrate from the substrate holder plate.

39. Close the red lever and load lock. Press **PUMP DOWN LOAD LOCK** and press **YES** in the window.
40. In the **CONTROL** window turn **OFF** the heaters.
41. In the **CONFIGURATION** window turn **OFF** the **DRY PUMP**.
42. Logout of the Beneq software and shut down the laptop.
43. In the chase behind the ALD turn **OFF** the following utilities:
 - a. Nitrogen N2 on the wall.
 - b. Switch the Main Power handle to **"I"** on the control panel.
 - c. Close both water lines to the roughing pump.
 - d. Turn **OFF** the chiller rocker switch.
44. Logout of the tool in your FOM account.