











## **Usage Notes for Anicon 125 / 150 mm**

### **Guide for using the Anicon correctly**

#### **Gas cylinders**

All gas cylinders should be turned on or off at the cylinder head. At no time should a user adjust a pressure regulator. Clockwise for all valves, means CLOSED. The standard off configuration for the system is to close the cylinders and delivery valve, but leave all other valves alone.

## CVD procedure for Low Temp oxide and Polysilicon deposition

Follow these steps for deposition of oxide (SiO<sub>x</sub>) or polysilicon on a silicon substrate. For oxide processes, SiH<sub>4</sub> and O<sub>2</sub> are used; for polysilicon, SiH<sub>4</sub> and H<sub>2</sub> are used.

**Verify that the vacuum pumps are running, that the chilled water, the compressed air and Nitrogen are on.**

Turn on the computer monitor; if it is not already on, logon and enter the password. Clear any fault condition before starting the process. Record the date, the time and your name in the user log sheets. Make sure that the scrubber system is on and ready.

### A. UNLOAD BOATS

1. If the hoist is down, Check the chamber pressure, it must be <50 mTorr on the indicator.
  - a - If the pressure is > 50 mTorr, open the SOFT START type (O) and press Enter to open the valve.
  - b - If the pressure is < 50 mTorr, close the SOFT START, type (C) and then press Enter. Open the ISO valve type (O) and then press Enter. Pump to the base pressure P1 = 38 mTorr.
  - c - Close the ISO valve by typing (C) and pressing Enter.
  - d - Open the N<sub>2</sub> Backfill valve by typing (O) and pressing Enter, this will raise the chamber pressure to atmospheric pressure.
  - e - Raise the Hoist, by typing (U) and pressing Enter to raise the hoist.
  - f - Close the Backfill valve, by typing (C) and pressing Enter after the hoist begins to rise.
2. If the loader robotic arm is in the SAFE (retracted) Position, type (U) and press Enter for unload. If the wafer boats are in the chamber, they will be unloaded.
3. Set the desired process temperature, using the computer keyboard type in 420°C (standard LTO process temperature) Check the chamber temperature on the temperature control panel display. Type (D) and press Enter to lower the hoist.

**Note: the following twenty steps set up the system to flow O<sub>2</sub> during temperature stabilization. This will remove moisture and contaminants that might be in the chamber.**

### B. GAS LINES EVACUATION

4. Open the SOFT START, type (O) and then press Enter to open the valve.
5. When the pressure is < 50 mTorr, close the SOFT START, type (C) and press Enter, open the ISO valve, type (O) and press Enter.
6. With all the gas valves still closed at the cylinder, and the chamber temperature at 420°C. Adjust the reactive gas flow controller to fully open, hold down Ctrl and using the + key increase to 250 SCCM. This evacuates the gas lines and flow controllers up to the shut-off valves at the cylinders.
7. Pump the chamber to the base pressure of 38 mTorr.
8. Set the pressure controller to 100 mTorr by holding down the Ctrl key and using the + key to increase the desired pressure value.
9. Close all the gas flow controllers to fully close. Hold down the Ctrl key and using the - key to decrease the pressure value to 0 SCCM.

### C. LOAD BOATS

10. Close the ISO valve by typing (C) and pressing enter.
11. Open the N<sub>2</sub> backfill by typing (O) and pressing enter, this will raise the chamber pressure to atmosphere.
12. Raise the hoist by typing (U) and pressing Enter, the hoist will be raised.
13. Close the N<sub>2</sub> backfill by typing (C) and pressing Enter.
14. The robotic arm boat loader is in the safe position, type (H) for the robotic arm loader to go to the home position then press enter, and now you can load the boats.
15. Load the wafer boats onto the robotic arm forks. The boats are marked with F for front. Make sure that the F is facing you. The wafer flats are pointing down. The cap of the boat is keyed.
16. Type (L) and press Enter to place the boats in the chamber and return the robotic arm to the safe position.
17. Lower the chamber by typing (D) and pressing Enter, to lower the hoist (DN).
18. Open the soft start by typing (O) and pressing Enter, to open valve.
19. When the chamber pressure is <50 mTorr close the soft start by typing (C) and pressing Enter, then open the ISO valve by typing (O) and pressing Enter to open the valve.
20. Pump the chamber to the base pressure of 38 mTorr.

### D. LEAK RATE TEST

21. With the main valves off, adjust SiH<sub>4</sub>, DP1 and DP2 gas flow controllers to fully open. (This purges the gas lines and flow controllers up to the shut-off valves.)
22. Close the O<sub>2</sub> gas main valve and adjust the O<sub>2</sub> gas flow controller to fully open, by holding down the Ctrl key, and using the + key to increase the flow.
23. Close the ballast by typing (C) and pressing Enter, to close the valve.
24. When the base pressure has reached 38 mTorr, close the ISO valve by typing (C) and pressing Enter, the valve will close.
25. Check the chamber pressure at one-minute interval for four minutes, the leak rate should be less than 15 mTorr / min.
26. Adjust the O<sub>2</sub>, the SiH<sub>4</sub>, the DP1, and the DP2 gas flow controllers to zero by holding down the Ctrl key, and using + and – keys to increase or decrease the flows.
27. Open the ISO by typing (O) and pressing Enter.
28. Open the ballast by typing (O) and pressing Enter.
29. Open the O<sub>2</sub> gas by typing (O) and pressing Enter, than adjust the gas flow by holding down the Ctrl key, and using the + key to set the flow to 250 SCCM, (standard LTO process).

### E. PREPARATION FOR DEPOSITION



24. All the gas flow controllers are fully closed.
25. Open the ballast by typing (O) and pressing Enter, (the flow rate is factory set).
26. The O<sub>2</sub> gas flow controller is at zero, open the valve to adjust the O<sub>2</sub> gas flow by holding down the Ctrl key and using the + key to increase the flow to 250 SCCM.
27. Set the process pressure by holding down the Ctrl key and using the + key to increase the process pressure to 100 mTorr (standard LTO process). Check the pressure until it stabilizes at the set point. Allow the temperature to stabilize before proceeding to the next step.
28. All the gas lines are now open to the tool from the gas cylinders. Slowly charge the system.

## F. DEPOSITION PHASE

29. Allow the O<sub>2</sub> gas to flow for a minimum of two minutes.
30. Open the SiH<sub>4</sub> gas by typing (O) and pressing Enter. Set the desired flow by holding down the Ctrl key and using the + or – keys to control the gas flow (standard process flow rate: 250 SCCM).
31. Start timing the deposition process when the silane gas flow begins.
32. Monitor the chamber pressure and the flow rates during deposition.

## G. END DEPOSITION & REMOVE BOATS

33. When the deposition phase is completed, switch off the SiH<sub>4</sub> gas by closing the valve, type (C) and press Enter. Ramp the SiH<sub>4</sub> flow controller down to 0 by using the Ctrl key and the - key. Leave the O<sub>2</sub> gas flow on for two minutes to react any residual SiH<sub>4</sub> gas in the chamber. Switch the O<sub>2</sub> gas off by Typing (C) and pressing Enter. Ramp the O<sub>2</sub> gas flow controller down to 0 by using the Ctrl key and the - key, let the system pump the chamber down to 38 mTorr for three minutes.
34. Close the ballast valve by typing (C) and pressing Enter, to close the valve.
35. Pump the chamber to the base pressure of 38 mTorr.
36. Close the ISO valve by typing (C) and pressing Enter.
37. Open the N<sub>2</sub> backfill by typing (O) and pressing Enter, to raise the chamber pressure to atmosphere.
38. To get the hoist up type (U) and press Enter.
39. Close the N<sub>2</sub> backfill after the hoist begins to rise, by typing (C) and pressing Enter.
40. Remove the wafer boats from the chamber (unload the chamber by typing U and pressing Enter).
41. Remove the boats from the loader robotic arm then return the loader to the safe position by typing (S) and pressing Enter.

## E. STANDBY MODE

42. Lower the hoist without wafer boats inside the chamber by typing (L) and pressing Enter.
43. The auto loader fork is in the "SAFE" Position, if not, type (S) and press Enter.
44. Open the SOFT START valve by typing (O) and pressing Enter.
45. When the pressure is < 50 mTorr, close the SOFT START valve by typing (C) and pressing Enter. Open the ISO valve by typing (O) and pressing Enter.
46. Pump down the chamber to a base pressure of 38 mTorr.
47. Evacuate the gas lines back to the cylinders SiH<sub>4</sub> or reactive gases, and pump the line down to 30" of Vacuum.
48. Before lowering the chamber process temperature, all reactive gas lines must have been evacuated. Lower the temperature to 20°C, by using the keyboard to decrease the set point, by holding down the Ctrl key and pressing the- key. Check the chamber temperature from time to time to make sure that temperature is decreasing.
49. Close the ISO valve by typing (C) and pressing Enter, to close the valve.
50. Log off, and shut down the PC.