Technics 900 PECVD

PECVD Operation Summary for Silicon Nitride or Silicon Oxynitride Deposition

(Revised Nov. 2005)

- **Silicon Nitride** is deposited using Ammonia (NH3, GAS A) and Silane (SiH4, GAS B)
- **Silicon Oxynitride** is deposited using Silane (SiH4, GAS B) and Nitrous Oxide (N2O, GAS C)
- See log book for specific recipes

*The chamber should always be vented and purged three times before opening, just in case there is silane in the chamber! To do this, turn off the SOL’N switch, then flip on the VENT switch for ONLY 1 second. Then turn on the SOL’N switch again. Repeat 3 times!*

1. **Chamber Cleaning** (Should ONLY be done with chamber at room temperature and is required before each run!)
   - **NOTE:** Both CF4 and O2 are connected to GAS 2. The mixture is controlled by the valve assembly on the right side of the PECVD unit.
   - a. Open the CF4 and O2 bottles (located in service chase behind PECVD)
   - b. Vent and purge the chamber 3 times to remove remaining gases
   - c. Vent the chamber (VENT switch), open lid
   - d. If necessary, vacuum out the inside of the chamber
   - e. Wipe the chamber with a chem-wipe moistened with deionized water
   - f. Wipe dry
   - g. Close and pump down the chamber (SOL’N switch)
   - h. Turn on GAS 2. The pressure should stabilize to 350 mT (315 mT CF4 + 35 mT O2).
     - If not, do the following:
       - i. Note the valve assembly on the right side of the PECVD unit, consisting of two metering valves, and an on/off valve for the O2
       - ii. Close the O2 (on/off) valve
       - iii. Adjust the CF4 metering valve so the chamber pressure is 315 mT (takes a while to stabilize)
       - iv. Open the O2 valve
       - v. Adjust the O2 metering valve so the chamber pressure is 350 mT (also takes a while to stabilize)
      - i. Turn on the POWER and adjust to 270 W
    - j. Etch for 15 minutes. Etching to bare metal may take hours depending upon the amount of previously deposited material
   - k. Turn off POWER
   - l. Turn off GAS 2
   - m. Allow the chamber to pump down until the pressure is stable
   - n. Turn off SOL’N switch
   - o. Vent and purge the chamber 3 times to remove remaining gases
   - p. VENT, open, and inspect the chamber. If desired, repeat steps e-m
   - q. Close the O2 and CF4 bottles
   - r. Close and pump down the chamber (SOL’N switch)

2. **Turn On Process Gases (NH3 and SiH4, or SiH4 and N2O)**
   - a. N2O is located in the service chase behind the PECVD, and opened by turning the tank valve counterclockwise
   - b. NH3 is in a gas cabinet number 1 in room 1254, and opened by turning the tank valve counterclockwise
   - c. SiH4 is in a gas cabinet number 2 in room 1254, and opened by pressing the OPEN VALVE button on the gas controller above the cabinet. *If the red “Remote Shutdown” light is on, press ALARM SILENCE, followed by OPEN VALVE.*

3. **Preparation for Deposition**
   - a. Turn off SOL’N switch
   - b. Vent and purge the chamber 3 times to remove remaining gases
c. **VENT** the chamber and open the lid

d. Load your samples

e. Close and pump down the chamber (**SOL’N** switch)
f. Set the heater controller to 305° (temp runs about 5-10° low) and flip on the **HEATER** switch. The platen takes about 45~60 minutes to heat up

g. Verify the appropriate **CAL** settings:
   i. **GAS A** (NH3) = 2.00
   ii. **GAS B** (SiH4) = 2.00
   iii. **GAS C** (N2O) = 2.00

h. Set the flow rates of the desired gases to zero
i. Set **POWER** to zero (knob fully counterclockwise)

4. **Deposition (After Temperature Reaches 300°)**
   a. Turn on **GAS 1** switch
   b. Turn on desired gases (**GAS A & GAS B** or **GAS B & GAS C**) and adjust to desired **SET** points
   c. Switch to **READ** to verify actual gas flow rates
   d. When temperature and flow rates are stable, turn on the **POWER** and adjust to desired setting
   e. Watch for flow rate or power fluctuations during deposition
   f. After desired deposition time, turn off the **POWER**
   g. Turn off the gases (**GAS A & GAS B** or **GAS B & GAS C**)
   h. Turn off **GAS 1** switch
   i. Allow the chamber to pump down until the pressure is stable
   j. Turn off **SOL’N** switch
   k. Vent and purge the chamber 3 times to remove remaining gases
   l. **VENT**, open the chamber, and remove your samples

5. **Shutdown**
   a. Turn off the **HEATER**
   b. Pump down the chamber, and leave the **SOL’N** switch **ON**!!!
   c. Verify ALL switches are **OFF** (**GAS A-D, GAS 1, GAS 2, POWER, HEATER, VENT**) EXCEPT the **SOL’N** switch
   d. Turn off the process gas cylinders
      i. N2O: turn tank valve clockwise
      ii. NH3: turn tank valve clockwise
      iii. SiH4: press **SHUTDOWN** button on gas controller
   e. Record information in the log book!