

ECE 220A: Sintering of metal contacts to Silicon

In order to make better, more reproducible metal contacts to the silicon semiconductor substrate, it is usual to carry out a thermal process called *sintering*. (Sintering takes place below the melting point of the materials, and refers to a process of grain growth and reduction of surface area of the composite grains).

The detailed instructions for the sintering procedure on the annealer are as follows:

1. Clean the sample in trichloroethane (TCE), acetone (ACE), isopropyl alcohol (ISO) for 1 minute each and then rinse in DI H₂O.
2. Close the vacuum valve located on the right side of the chamber by rotating the knob clockwise.
3. Open the N₂ toggle switch on the control panel to backfill the chamber. Leave the N₂ on while loading the sample.
4. Remove the glass plate lid. Place only one on sample on the graphite strip and replace the lid.
5. Close the N₂ switch on the control panel.
6. Open the vacuum valve, turn on the vacuum pump and pump to greater than 25 on the vacuum gauge near the vacuum valve.
7. Open the N₂H₂ regulator valve on the bottle located next to the doorway.
8. Open the N₂H₂ toggle switch on the control panel.
9. Partially close the vacuum valve to get a steady pressure of about 20 -25 on the vacuum meter.
10. Turn on the heater and temperature readout on the control panel.
11. Increase the Variac setting at 40 till the temperature reaches about 100 degrees centigrade. Set the Variac between 70 -80 and let the temperature rise to 450 degrees centigrade. Maintain the temperature at 450 degrees for the desired sintering time (15-30 minutes}.
12. Set the variac to zero at the completion of the desired sinter time. Let the temperature fall to less than 100 degrees.
13. Turn off the H₂N₂ toggle switch on the control panel.
14. Open the vacuum valve by turning anti-clockwise.
15. Close the vacuum valve again and open the N₂ switch on the control panel.
16. Remove your sample and put in a new sample if needed. Go to step 5 if repeating the procedure.
17. Replace the chamber lid.
18. Close the N₂switch on the control panel.
19. Open the vacuum valve and pump to greater 25 on the vacuum meter.
20. Close the vacuum valve and turn off the vacuum pump.
21. Turn off the heater and temperature readout.
22. Close the H₂N₂ regulator valve on the bottle next to the door.