

Sputter Coater

- *Deposition*

1. Insert key.
2. Open Ar gas and then flip the “Vent” switch up
3. Once top is open, flip the “Vent” switch back down.
4. Put sample in and make sure it’s stationary.
5. Use IPA to wipe down the edge of the cylindrical chamber.
6. Close top and then turn on the power.
7. Wait for the vacuum to reach ~35-50mtorr
8. Turn on Ar gas slowly.
9. Then turn the pressure to 100mtorr with the “Increase/Decrease” knob
10. Turn on the voltage and increase the current to 15mA.

If the Current/Plasma is flickering this means that the pressure is not exactly 100 mtorr or which creating vacuum the pressure was not allowed to reach below 50 mtorr by the user. Repeat from Step 7 if so. Otherwise make sure the pressure is 100 mtorr.

11. Once done, decrease voltage to zero and turn off the voltage
12. Turn the pressure down to ~40mtorr using the “Increase/Decrease” knob
13. Turn off the power.
14. Flip the “Vent” switch **slowly** and open the chamber.
15. Remove sample and close chamber.
16. Repeat Steps 5-7 and then turn the power off.
17. Remove key and make sure the Ar tank is closed.

PLATING

1. Place specimens in chamber
2. Close lid gently - power ON.
3. Flush chamber with argon 2 to 3 times using fine gas control knob.
4. Increase gas pressure with fine gas control knob to approximately 55 - 70 millitorr.
5. When gas pressure stabilizes turn hi-voltage switch to ON.
6. Turn high voltage control knob clockwise to achieve approximately 10 milliamps.
7. Alternately adjust gas pressure and high voltage knob until a reading of approximately 10 milliamperes is achieved on current meter at 55-70 millitorr.

NOTE: The initial appearance of plasma will cause chamber pressure to rise and fall due to molecular adhesion of water vapor, atmospheric gases and solvents. Adjust fine gas control until pressure and current stabilize.

If automatic timing is to be used:

8. Set timer to desired coating time.
9. Switch to AUTO - plasma will terminate automatically after time set has expired.
10. Switch pulse to ON position if pulse is desired. Time which is set on timer will be actual plating time during on cycle of pulse mode.
11. When specimen is coated:
 - reduce hi-voltage control to ZERO
 - turn hi-voltage switch OFF
 - CLOSE gas valve
 - switch to MANUAL
 - main power OFF
 - vent - Hummer VI vents automatically when main power is switched off
11. Remove specimens.

Plating

Hummer VI Operations Manual

Typical operating conditions:

Gold or Gold/Palladium Deposition

Voltage Control	Position 7-9
Pressure	40-80 Millitorr (Argon)
Current	10 Milliamperes
Approximate Plate Time	2 Minutes

Curves of typical plating times for various materials are shown in.

ETCH - TYPICAL OPERATING CONDITIONS

1. Place mode selector switch to ETCH. It is advisable to remove precious metal target and replace with aluminum etch ring to avoid contamination of plating target.
2. Place specimens in chamber.
3. Close lid gently.
4. Power ON.
5. When 30 mt or less is achieved turn high voltage switch ON.
6. Increase hi-voltage knob to position 5-6.
7. OPEN fine gas control valve until plasma appears.
8. After plasma appears, adjust current by using this valve to 10 milliamperes or less for biological or organic samples and from 10-20 milliamperes for inorganic samples.
9. When specimen is etched follow directions for shut down as in plating.

Typical operating conditions for etching function:

Metallurgical Specimen

Voltage Control	Position 6
Pressure	50-100 Millitorr (Argon) (Variable)
Etch Time	6-10 Minutes

Biological Specimen

Voltage Control	Position 4-5
Pressure	40-60 Millitorr (Argon) (Variable)
Current	10 Milliamperes
Etch Time	2-5 Minutes

PLASMA PROCESSING

The Plasma Processing is utilized for ashing, cleaning and etching of metals, ceramics, glasses, organics and composites. This is a chemical-physical variation as opposed to the D. C. Etching (Sputter Etching) which is a physical reaction by ion bombardment. The specimens are reacted with active specie of oxygen, carbon tetrafluoride or other reactive gas. In addition, organic and inorganic coating can be deposited by Plasma chemical vapor deposition (CVD). WARNING: When using plasma processing which is corrosive or with oxygen, or with a corrosive reactive gas, an oxygen resistant oil must be used in the vacuum pump or damage to the pump or explosion may result.

To Plasma Process:

1. Place the MODE SELECTOR switch to PLASMA ESC.
2. Turn ON MAIN POWER SWITCH and evacuate the system to 20 millitorr.
3. Place Hi VOLTAGE SWITCH to 0.
4. Increase GAS VALVE to read a pressure of 1 torr.
5. Increase VOLTAGE CONTROL to produce a current of 20 milliamperes on the current meter.
6. Process for desired time with desired gas; oxygen for cleaning, ashing, and etching of organics, carbon tetrafluoride* for etching of metals, ceramics and glasses, ethylene for deposition of ethylene coatings and argon or nitrogen for cross-linking of organic surfaces such as TEM and SEM specimens to improve stability to electron beam exposure.

*Vent toxic exhaust fumes from room.