

OPERATING PROCEDURES

Indium Evaporation Deposition

Rev. 11/15/01

System Safety Precautions

1. Check water interlock lamp is **ON**. [Located at the bottom of the instrument panel]
2. **DO NOT** access the interior of the system with the filament power circuit breaker **ON**. System access should only be performed with filament power **OFF**.
3. The bell jar is of Pyrex and can be damaged with forceful use. **DO NOT** use the bell jar if the bottom seal gets chipped or damaged. A cracked bell jar should never be used.
4. The SCR controller current limit is set for 150 amps to limit its output to 1.8 KVA to prevent damaging the filament transformer.

Venting System

1. Make sure the filament circuit breaker is **OFF**.
2. Turn on the **NITROGEN**.
 - Turn on the cylinder valve located on the top of the cylinder.
 - Turn on the isolation valve located to the left of the pressure regulator.
3. Turn off the **ION GAUGE**.
 - Press the ON/OFF switch down on the GP-270 gauge controller.
4. On the Ultek Auto Pump Down Control, simultaneously press both **RED** start button and the **VENT** button.

The system will close the gate valve.
The vent valve will open.
The chamber will vent.

5. When the system is vented, you will hear the nitrogen leaking from the bell jar. Simultaneously press both **RED** start button and the **GAS** button. This will turn off the nitrogen flow.
6. Turn off the **NITROGEN**.
 - Turn off the cylinder valve located on the top of the cylinder.
 - Turn off the isolation valve located to the left of the pressure regulator.



Loading

1. Manually raise bell jar.
2. Insert sample into substrate holder and place the holder onto the support frame.
3. Open the shutter over the evaporating boat.
4. Lift out lower evaporation shield.
5. Using the scale, measure a quantity of indium and place in boat.

Example #1:

2 grams of indium
Shutter closed
Filament current 130 amps
Open shutter after 5 seconds
80 seconds deposition time
Film thickness $\approx 1.7 \mu\text{m}$

Example #2:

2.5 grams of indium
Shutter open
Filament current 150 amps
Evaporation of all materials
SEM measurement $10 \mu\text{m}$



6. Replace lower evaporating shield with shutter stop towards front.
7. Close the shutter over the evaporating boat.
8. Manually lower the bell jar and center on the base plate.
9. Proceed to **PUMP DOWN** section.

Pump Down

1. On the **Ultek Auto Pump Down Control**, simultaneously press both **RED** start button and the **PUMP** button.

The system will open the rough valve.
When the pressure is less than 100 mT, the rough valve will close and the gate valve will open.

2. Turn on the **ION GAUGE**.
 - Press the ON/OFF switch up on the **GP-270 gauge controller**.
3. The system can now be left to pump. It should pump into the 10^{-6} Torr range within one-half hour.

Note: Lower vacuum below 2×10^{-6} and higher current gives a better indium surface.



Deposition

1. With the system in the high vacuum range (10^{-5} to 10^{-6} Torr), you may begin evaporations.
2. On the **Ultek Auto Pump Down Control**, simultaneously press both **RED** start button and the **GAS** button. The filament is enabled once the GAS light is on.
3. Rotate the **FILAMENT ADJUST POT** all the way to the left. (Zero power setting)
4. Turn on the **FILAMENT** power switch.
5. Raise the filament adjust pot up until the filament begins to glow.
Adjust current as required for your process.
6. Open shutter.
7. When the deposition is completed, return the **FILAMENT ADJUST POT** to zero and turn off the filament power switch.
8. On the **Ultek Auto Pump Down Control**, simultaneously press both **RED** start button and the **PUMP** button. The filament is disabled once the GAS light is out.



Venting and Unloading

1. Make sure the filament circuit breaker is **OFF**.
2. Turn on the **NITROGEN**.
Turn on the **cylinder valve** located on the top of the cylinder.
Turn on the **isolation valve** located to the left of the pressure regulator.
3. Turn off the **ION GAUGE**.
Press the ON/OFF switch down on the **GP-270 gauge controller**.
4. On the Ultek Auto Pump Control, simultaneously press both **RED** start button and the **VENT** button.

The system will close the gate valve.
The vent valve will open.
The chamber will vent.

5. When the system is vented, you will hear the nitrogen leaking from the bell jar.
Simultaneously press both **RED** start button and the **GAS** button. This will turn off the nitrogen flow.
6. Turn off the **NITROGEN**.
 - Turn off the **cylinder valve** located on the top of the cylinder.
 - Turn off the **isolation valve** located to the left of the pressure regulator.

7. Manually raise bell jar and remove sample.

Pump Down for Standby

1. On the Ultek Auto Pump Control, simultaneously press both **RED** start button and the **PUMP** button.

The system will open the rough valve.
When the pressure is less than 100 mT, the rough valve will close and the gate valve will open.

2. Record usage in **LOGBOOK**.