Anatech Hummer IV Sputterer SOP

By Michael Lynn

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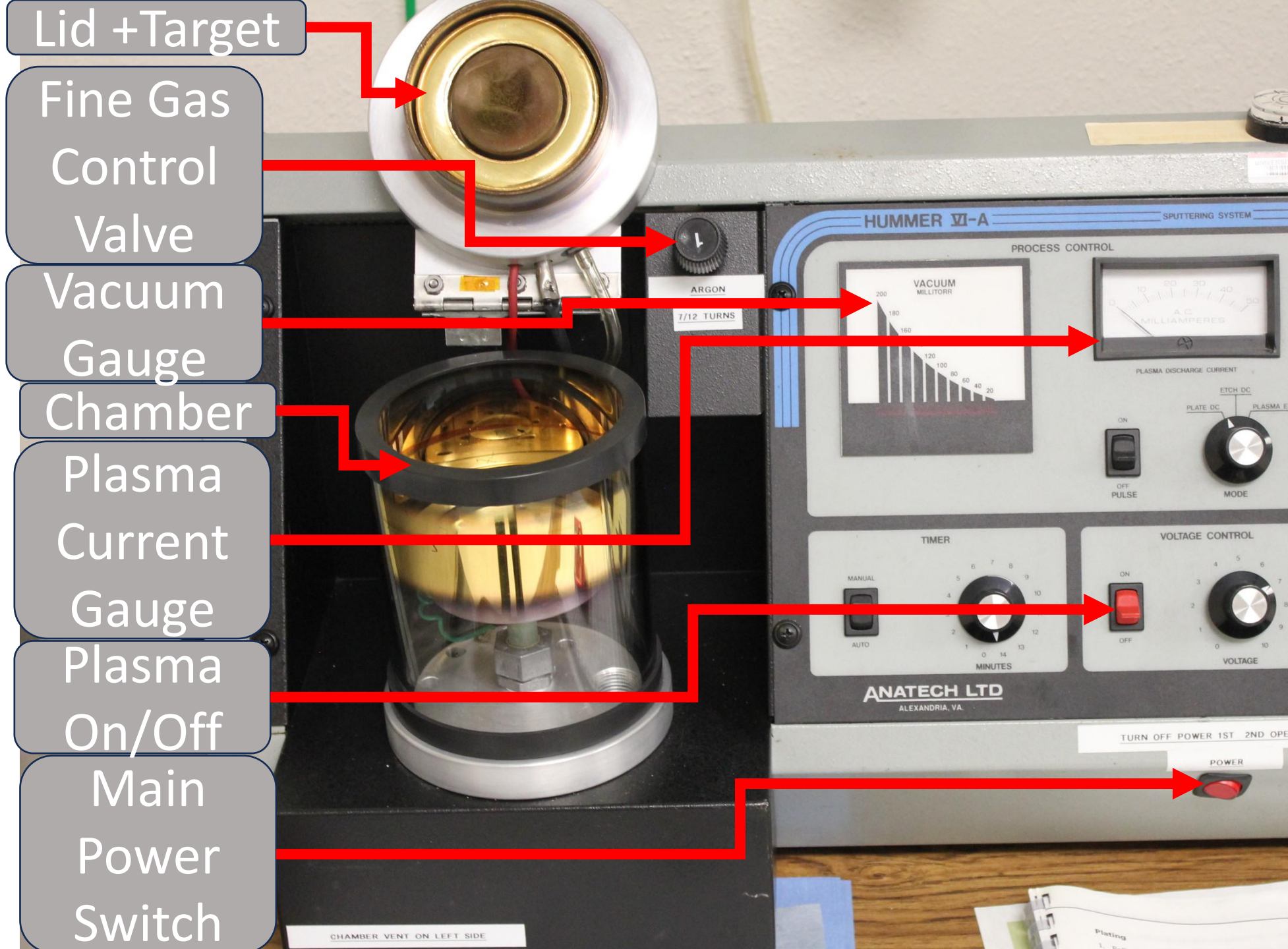
Identification

- Target
  4 OD” annular target.

  We have gold and platinum available

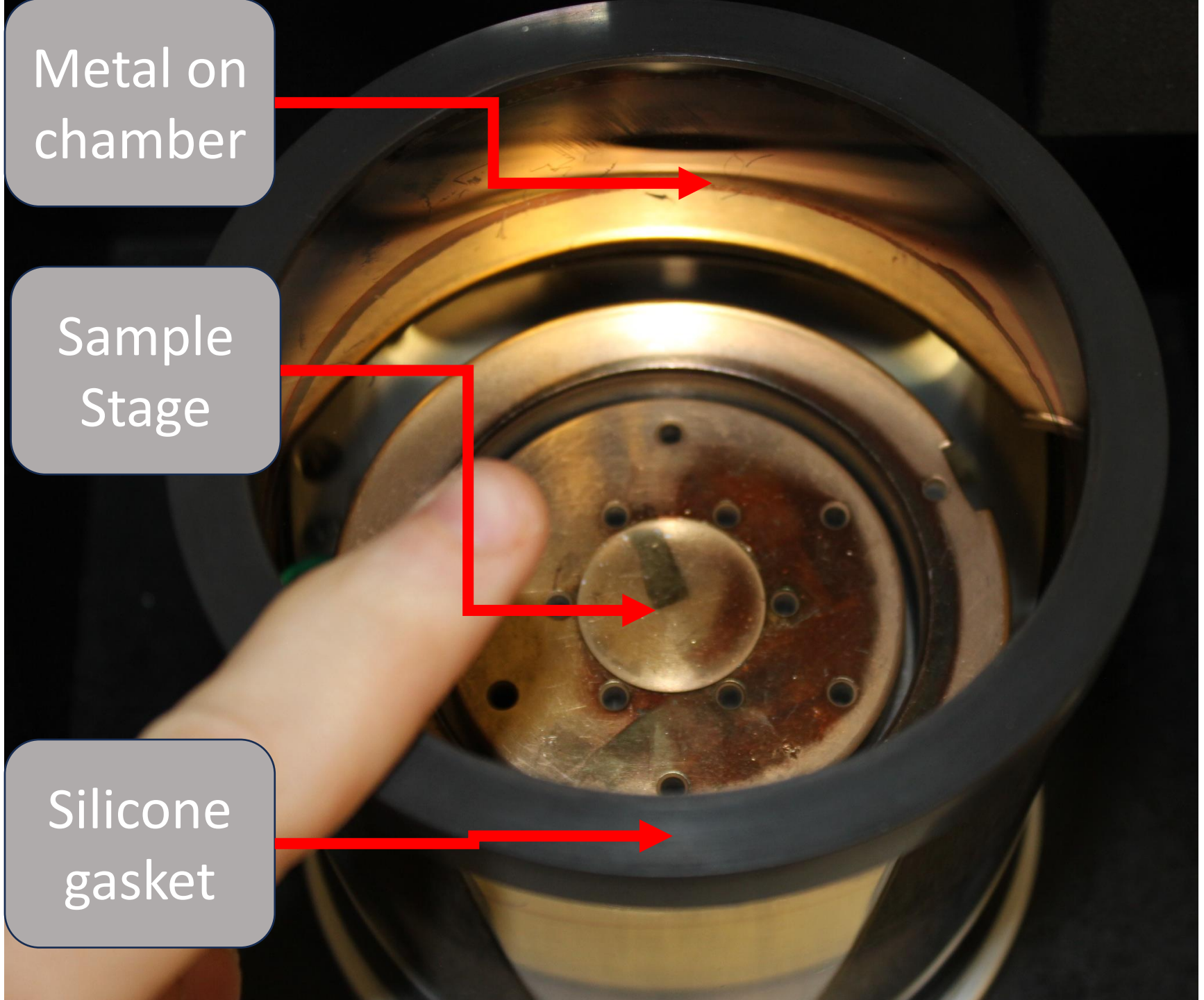
- Typical plating rates of
  ~5 nm/minute



Identification

Look at the color of the metal on the chamber wall. It should match the color of the installed target. Your samples can be placed on the sample stage.

The silicone gasket can be unreliable and will emit a low pitched humming sound until it seals properly against the lid and the base of the chamber

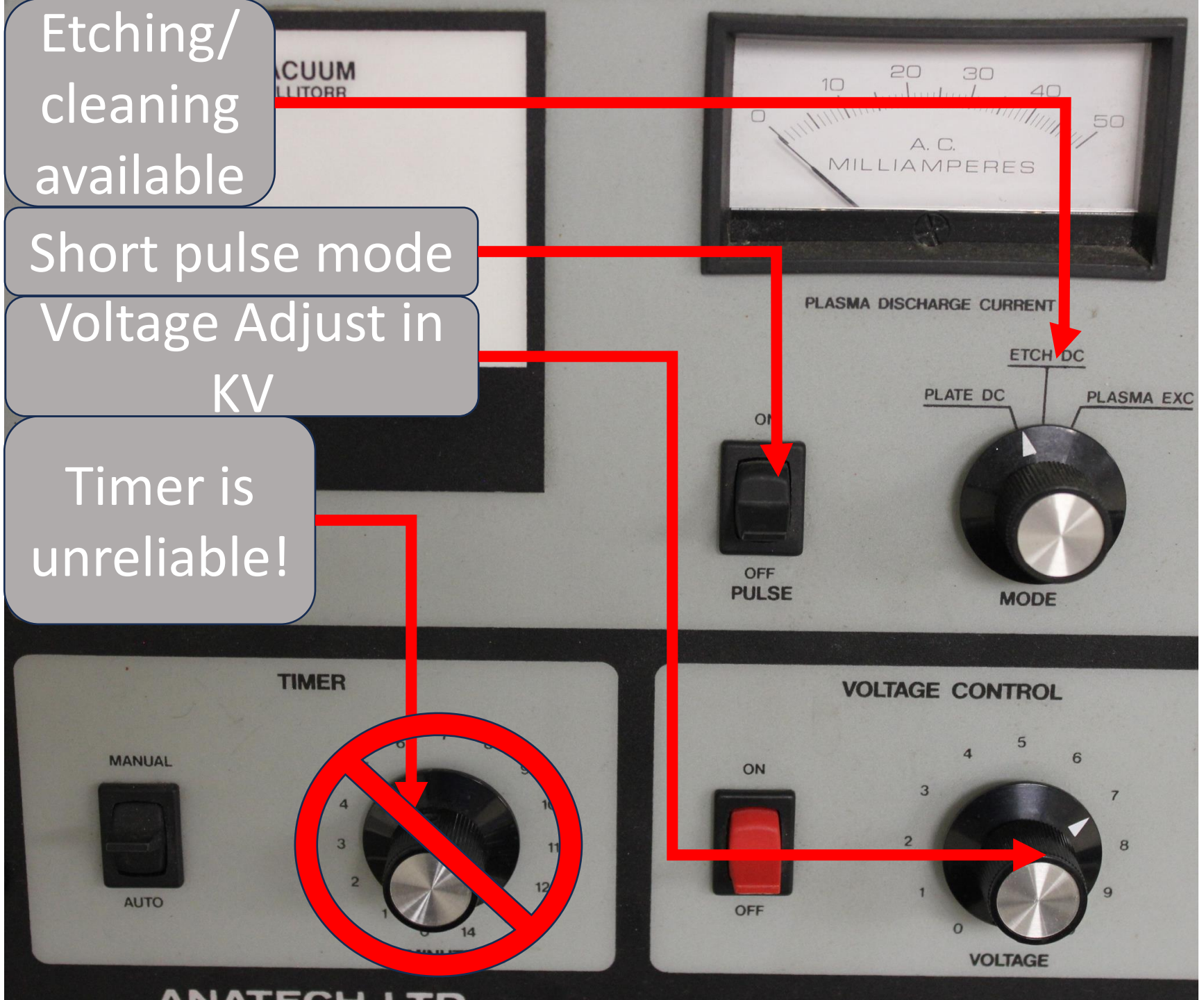


Identification

Deposition works on “plate dc” setting
Deposition can be performed in pulses or continuously.

Voltage control enables sputter rate control.
The time is unreliable do not use it.

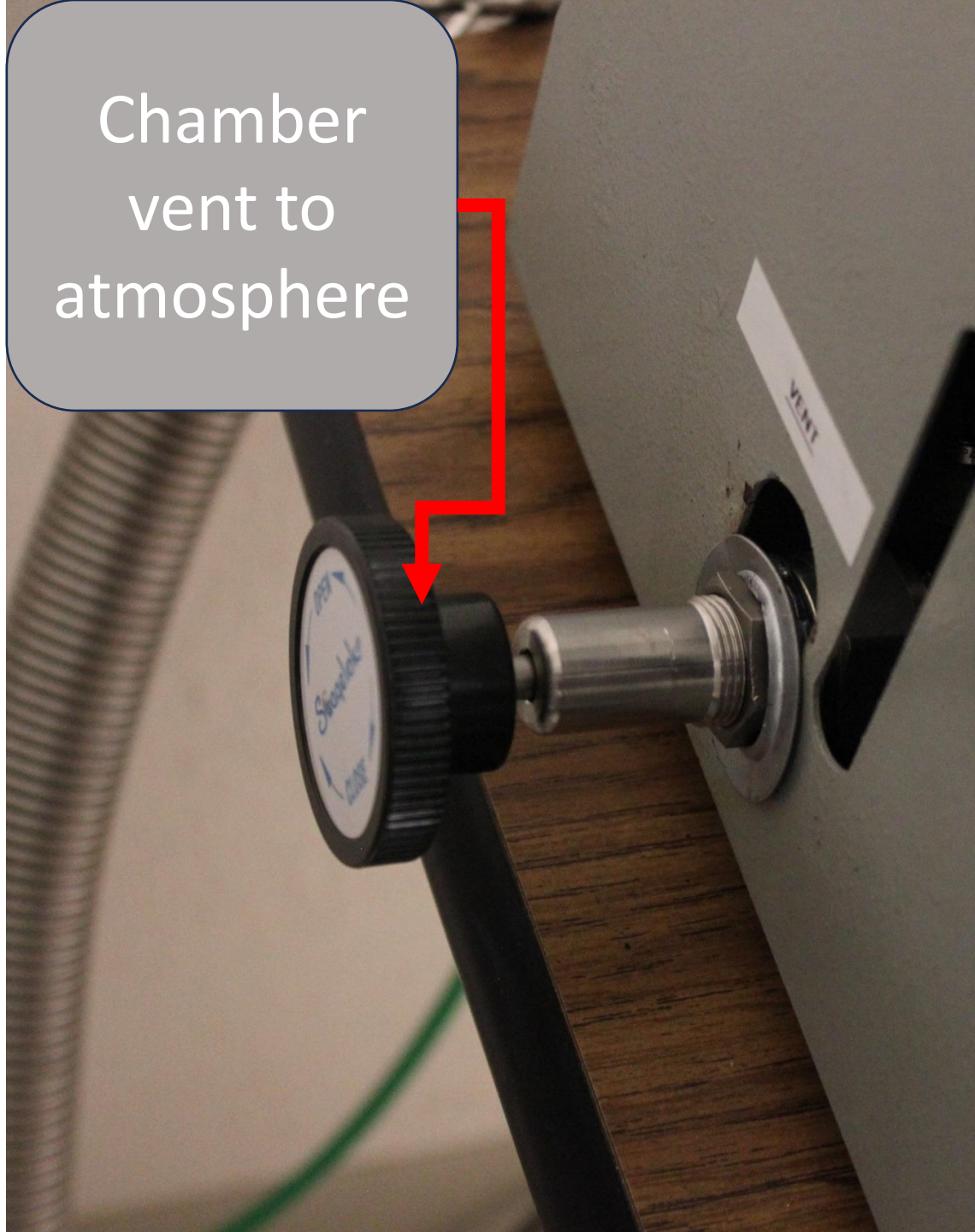
Etching and plasma cleaning can also be performed. We will focus only on deposition.



Identification

Before turning on the sputterer we must close the atmospheric vent on the left side of the machine pictured here.

Rotate the knob towards you gently, It may be slightly loose, but be sure it is closed securely before starting the machine.



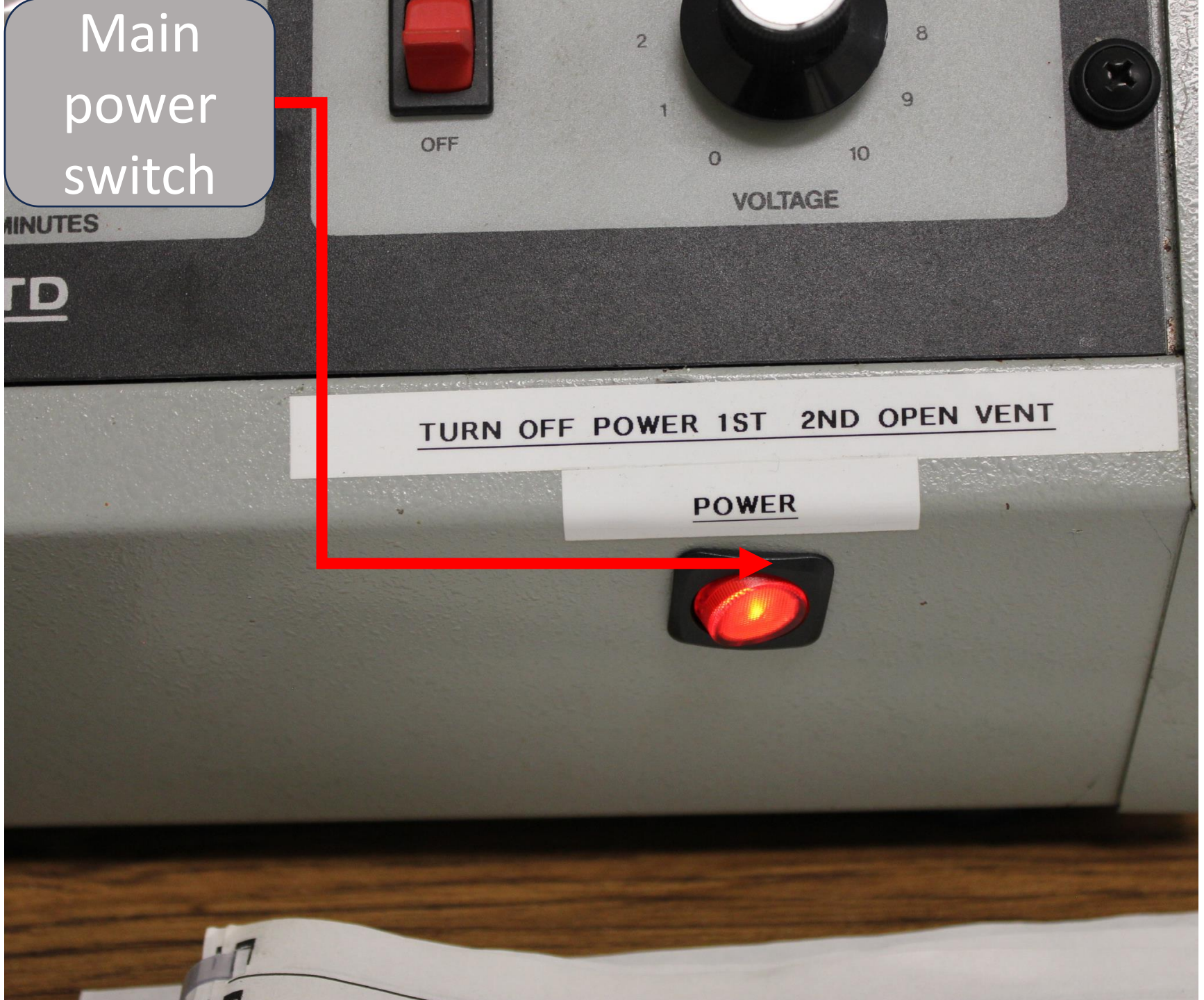
Identification

Once the vent valve is closed you can insert your samples into the chamber and close the lid on the sputterer. The lid may require some gentle maneuvering to seal properly. You will only know if it is properly sealed by listening until the humming is damped by the closure of the silicone gasket.

Identification

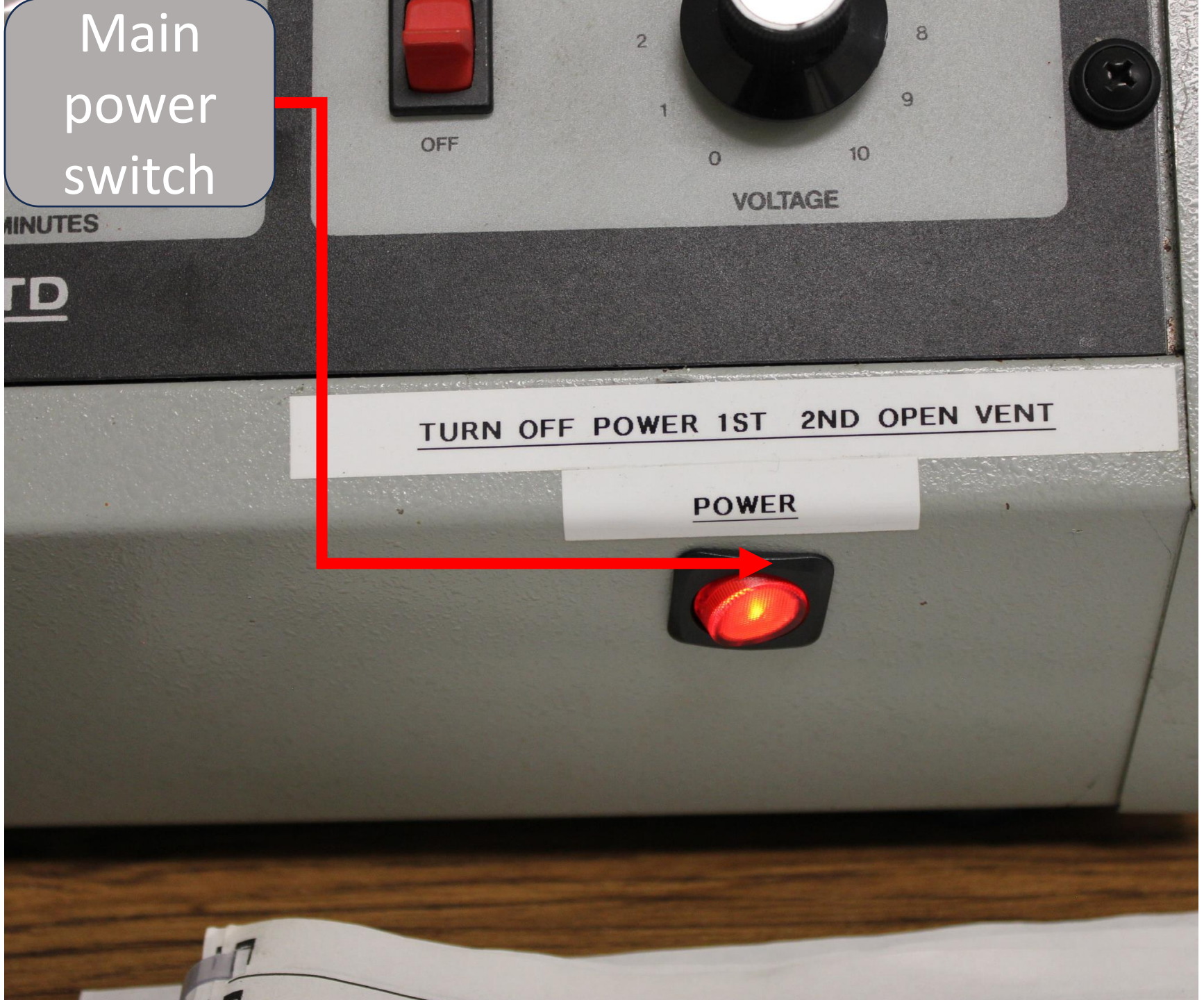
Once you get a good seal on the lid and chamber, you should check that the voltage setting is about 7-8 KV, and the mode is set to “DC plate”.

You may then turn on the main power switch and listen for the vacuum pump.



Identification

The vacuum pump should not be audible through the chamber seals. You must adjust the lid and chamber until the sound is no longer audible or just barely a low hum at the chamber seals.



Identification

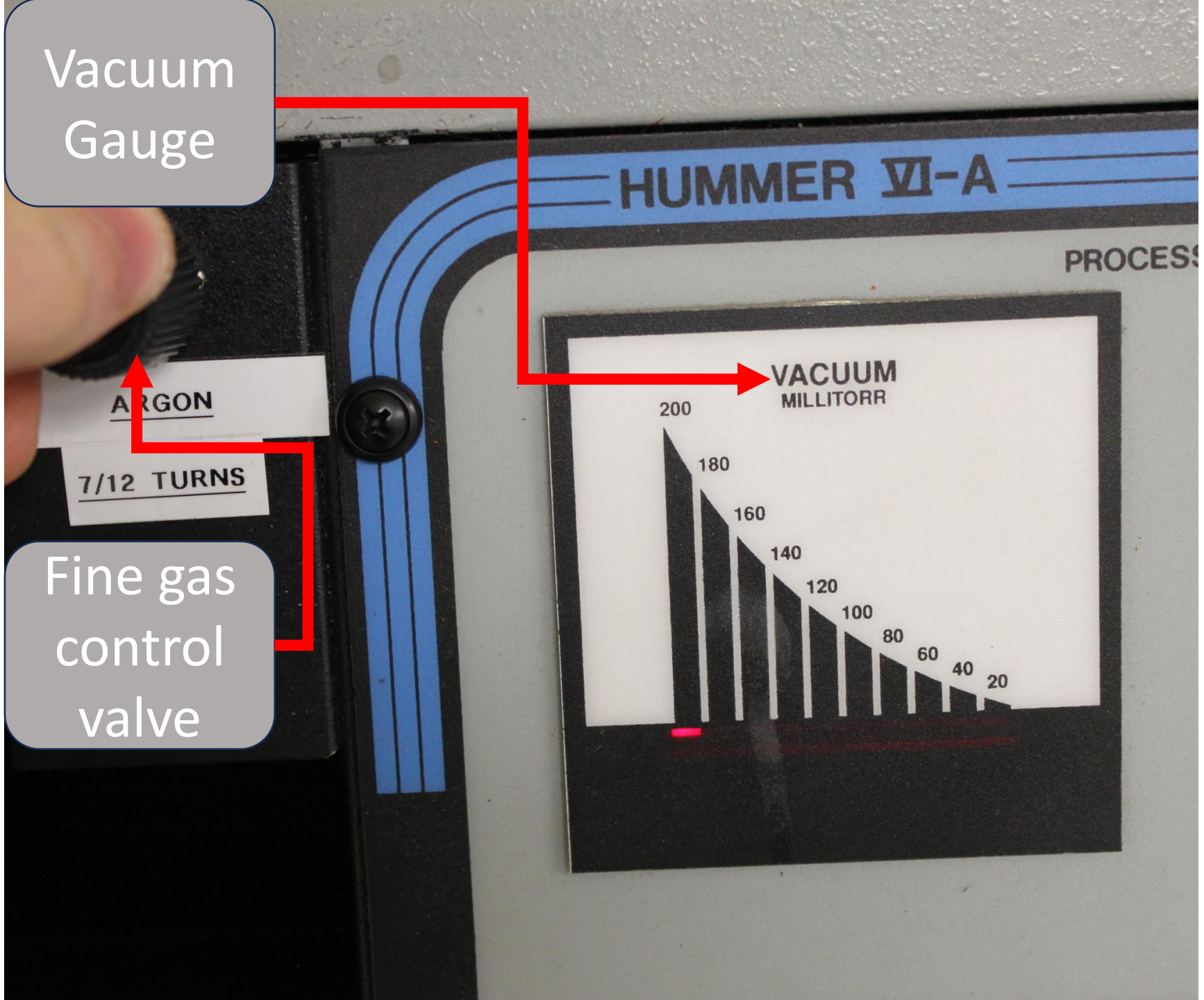
Ensure the timer switch is set to manual.

The automatic function will tie your sputtering to the built in unreliable timer. Don’t do that.

Identification

Once the chamber is sealed, take a look at the vacuum gauge. It should start out at 200 millitorr.

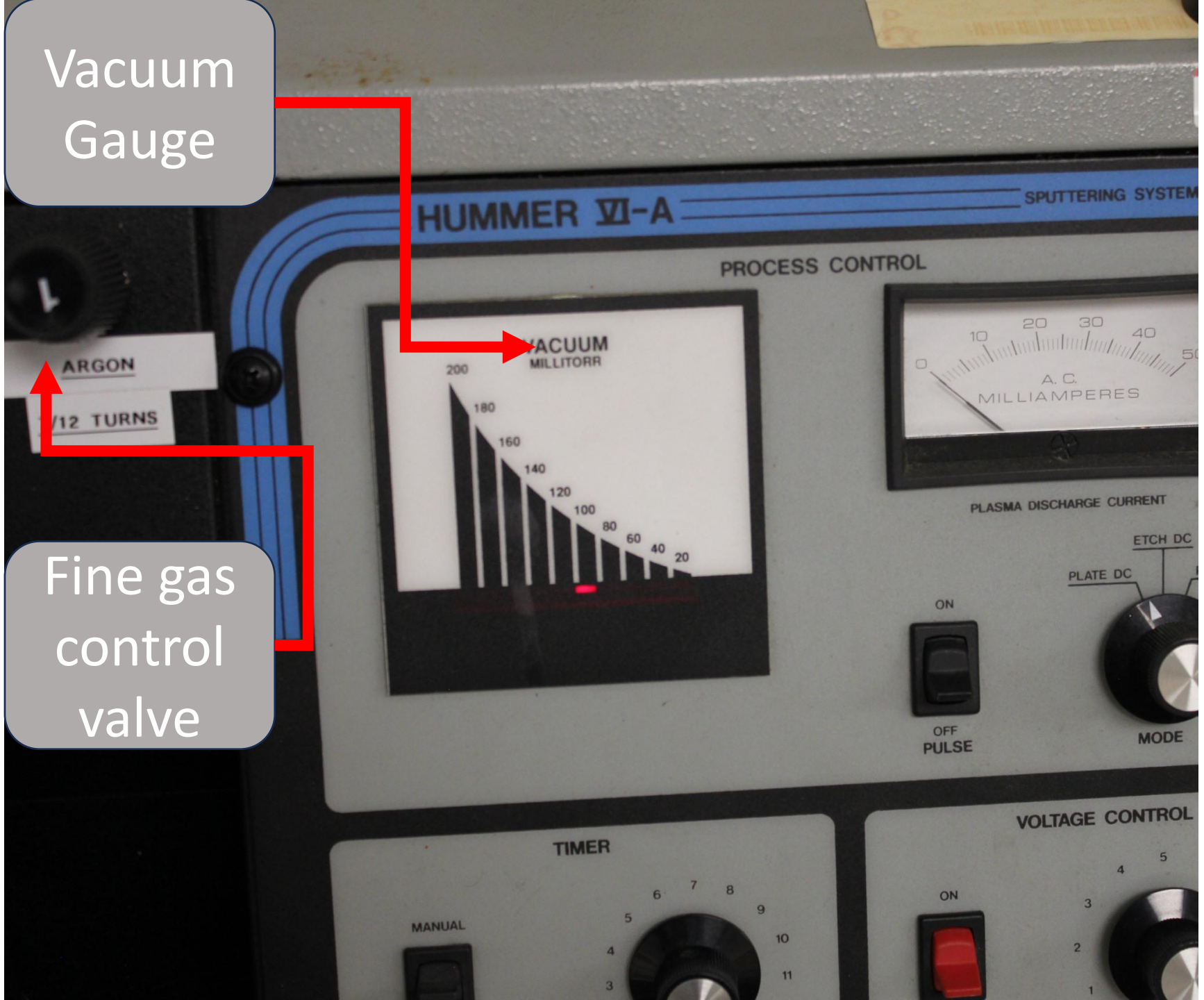
The red bar light should progress toward lower values to the right as the pressure in the chamber drops.



Identification

It should take about **5-10 minutes** (perhaps less) for the chamber to reach **20 millitorr.**

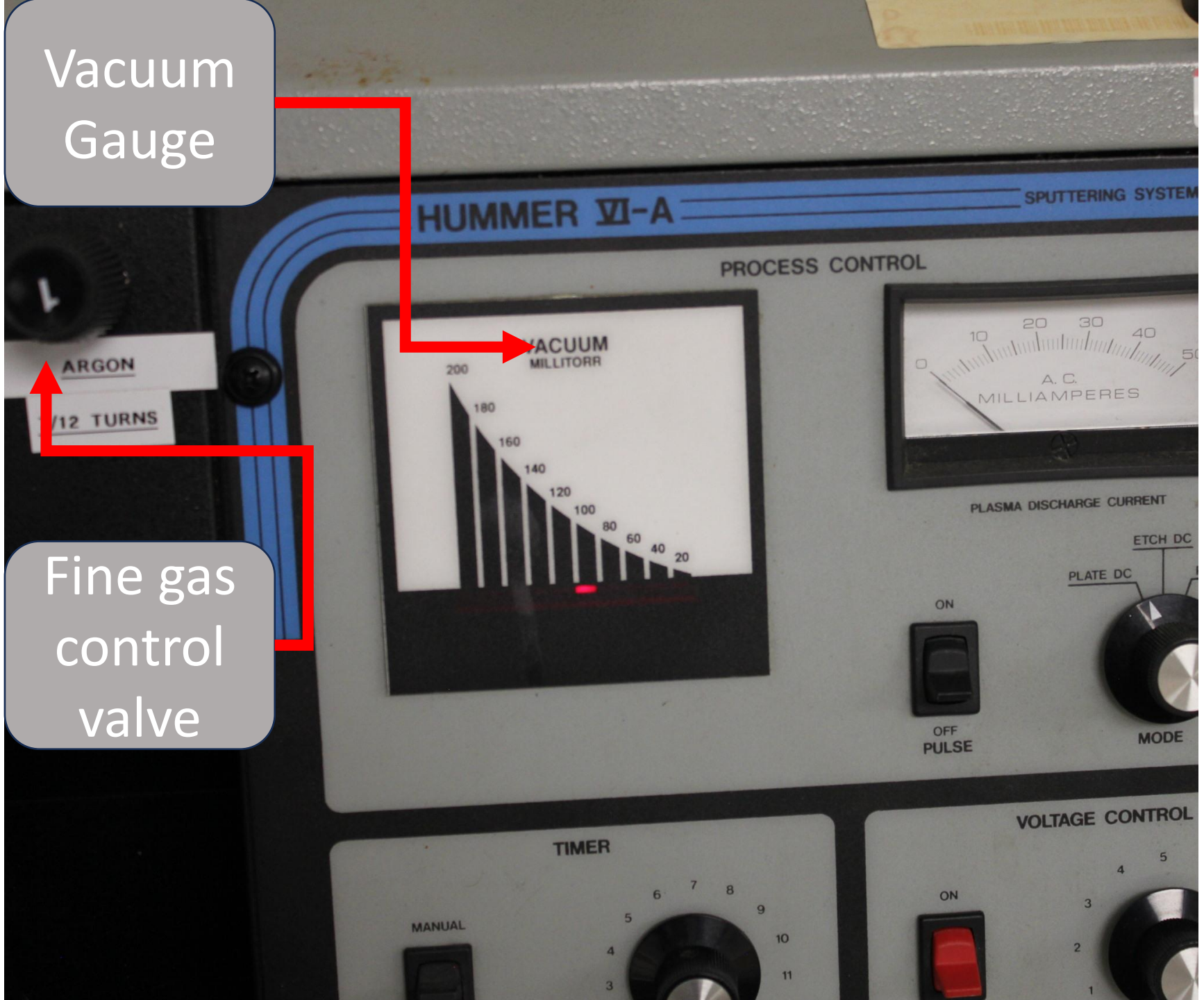
Once at 20 millitorr you may turn the fine gas control valve to flush the chamber with **Argon**. As you turn the valve gently, 5 to 7 times around, you should see the vacuum pressure increase as the red light moves left on the gauge.



Identification

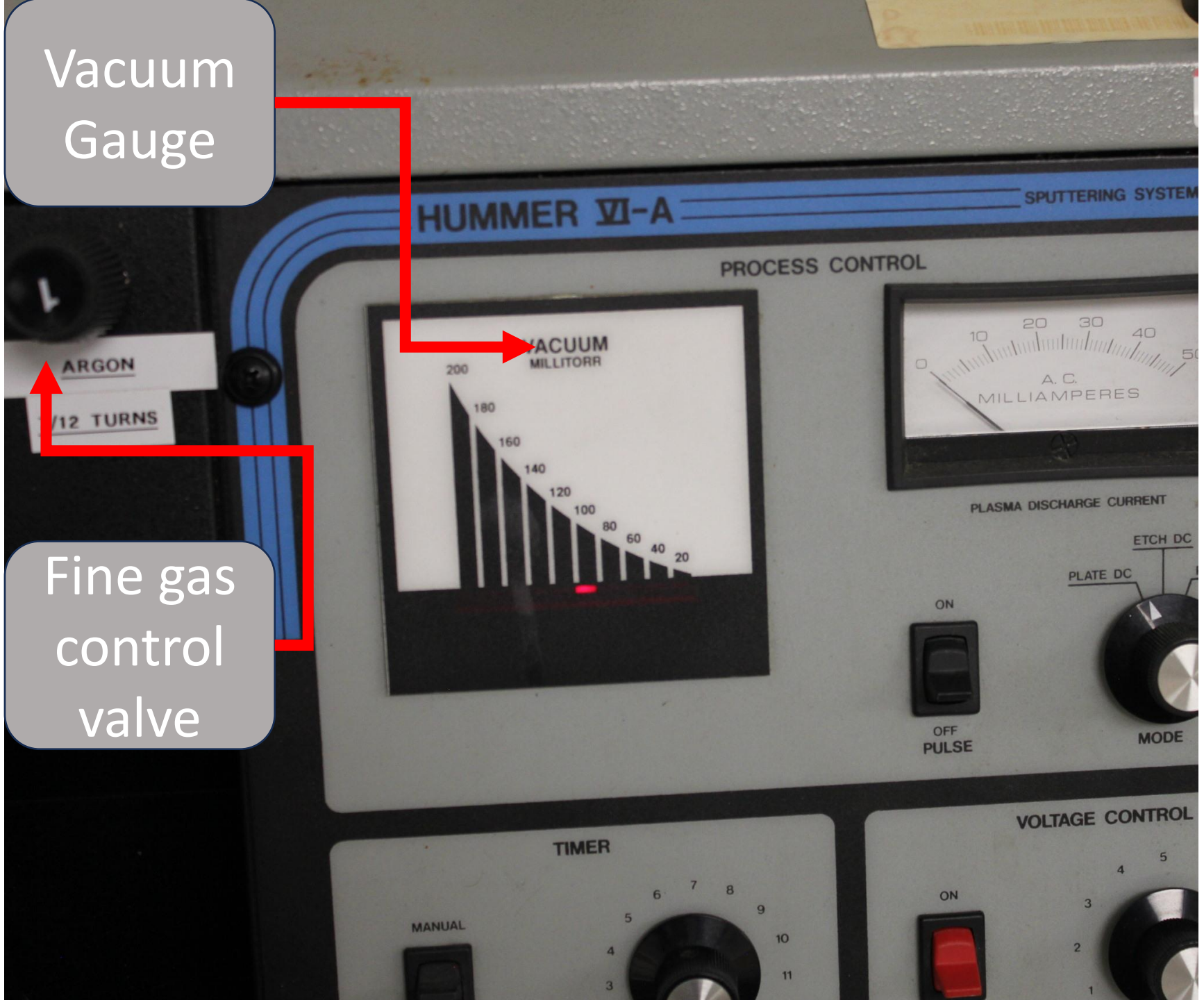
Turn the fine gas control valve counter clockwise until the pressure reaches 200 millitorr. Then turn the fine gas control valve clockwise until the chamber pressure returns to **40 millitorr.**

Repeat this step **twice** to ensure no oxygen remains in the chamber.



Identification

Once the purge is complete, set the fine gas control valve to a position such that the vacuum pressure reads **either 40, 60 or 80 millitorr.** The exact gas pressure will change the deposition rate. You will have to determine the exact value you require for your own research. **Or consult with HiDEC staff if this range wont work.**



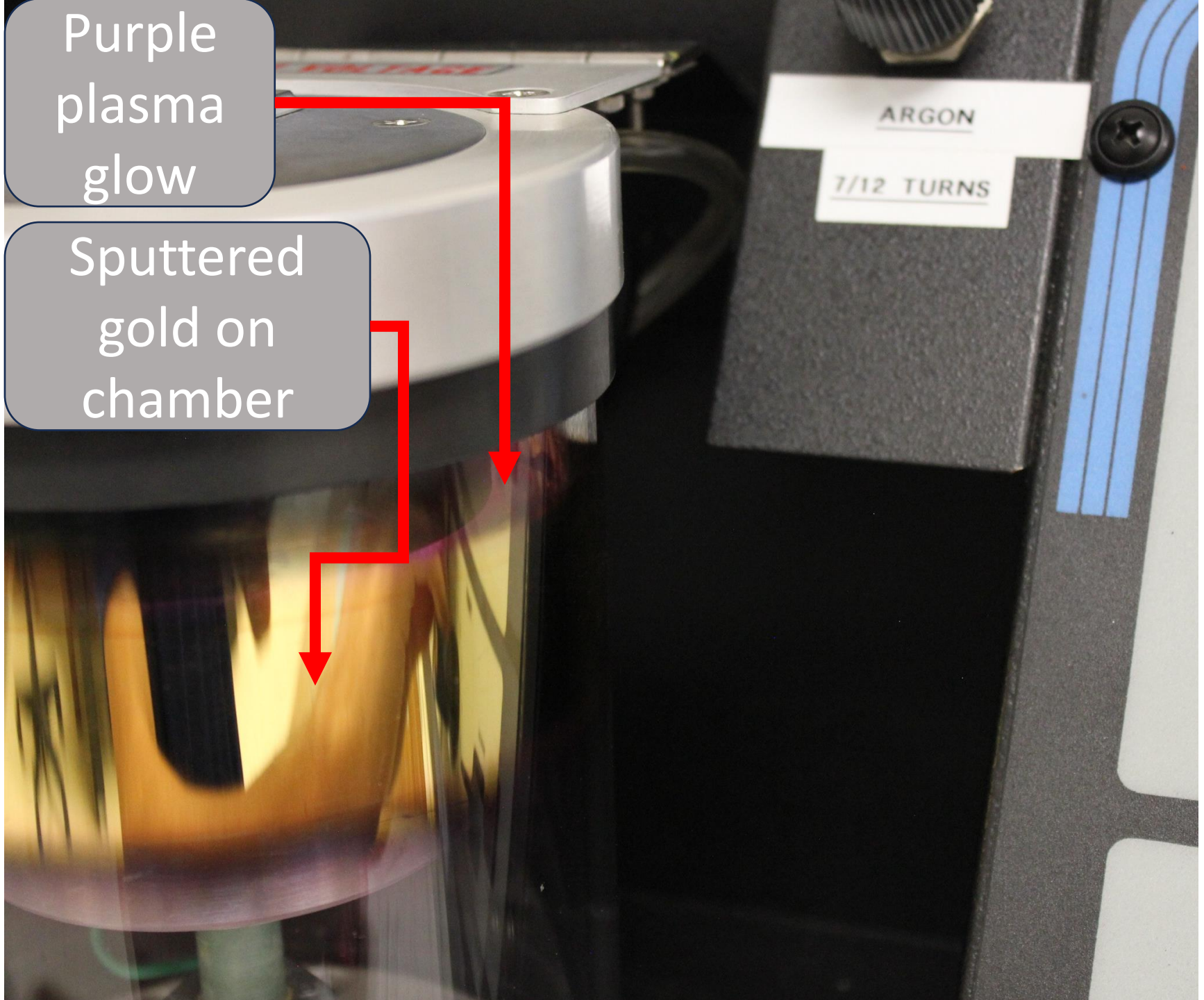
Identification

Once the chamber is purged and at pressure, you may switch the dc high voltage source on, by flipping the big (non lighted) red switch under “voltage control” on the front panel of the machine.

This will activate the plasma and start the deposition.

Identification

When you activate the high voltage at the correct pressure you should hear a click and a low buzzing sound, and see a steady and somewhat dim purple glow from the chamber. It may be blocked from view by the metal sputtered on the chamber walls.



Identification

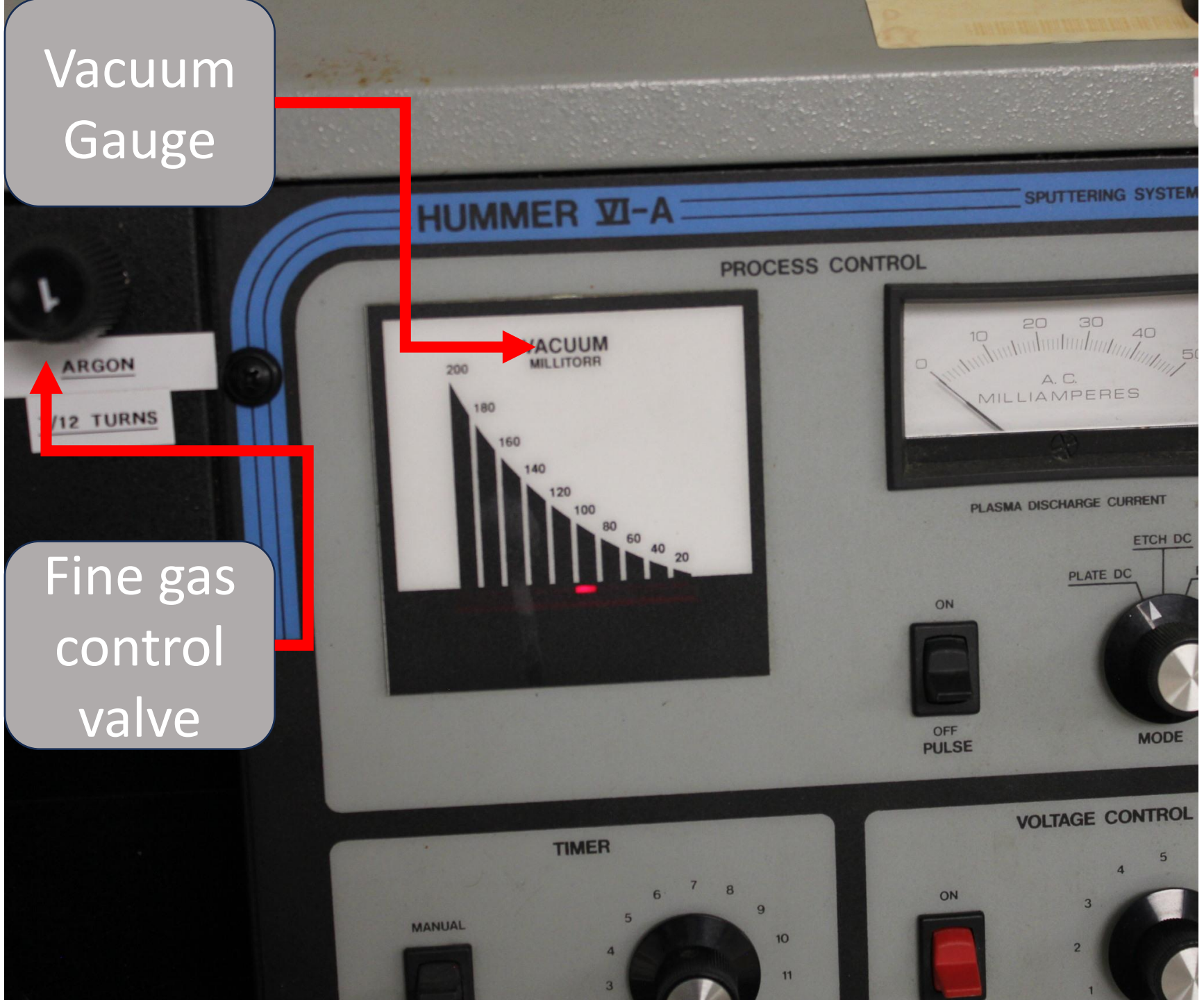
When you have finished depositing for your desired time **(no more than 5-10 minutes)** you may switch off the plasma. By turning the red high voltage switch off.

It is possible with short pulses to get **nearly** single atom thick metallic layers.

Identification

Completely close the fine gas control valve by gently turning it clockwise until does not turn any further. Tighten it 1/10th of a turn at the end with your hand to ensure it is completely closed.

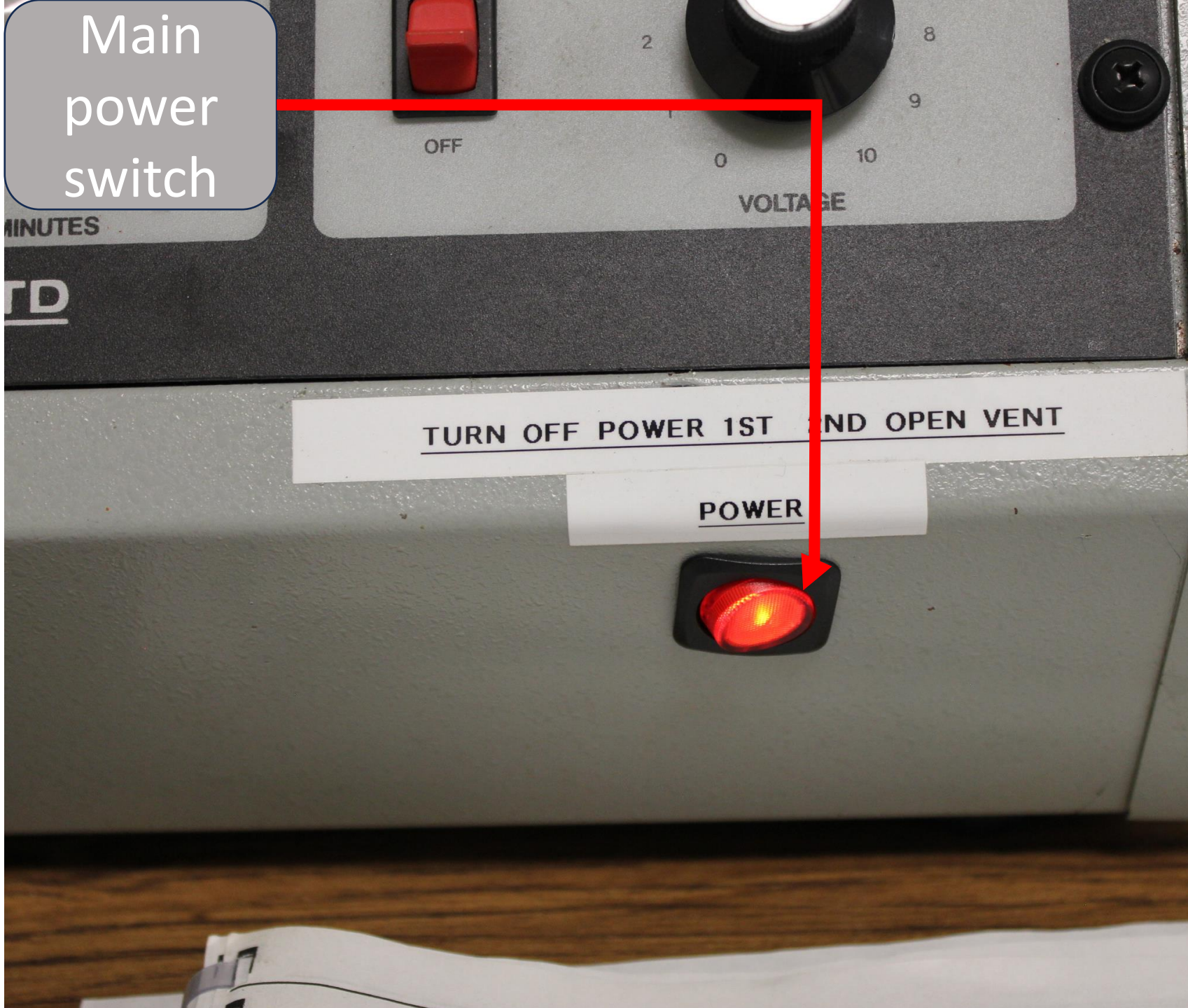
The vacuum pressure should once again drop to 20 millitorr as you do this.



Identification

Once the fine gas control valve is completely closed, IE not leaking expensive argon. You may hit the main power switch to shut off the vacuum pump and sputterer.

The sputterer chamber will not open at this time due to vacuum pressure on the lid. In the next step we will retrieve your sample.



Identification

Once the high voltage, main power switch and vacuum pump(from the main power switch) is turned off and the fine gas control valve is closed completely you may open the atmospheric vent on the left side of the machine to return the chamber to atmospheric pressure. You will hear this as an audible hiss of relief as the air rushes back into the chamber

This will allow you to open the chamber lid gently and retrieve your sample.