

GATAN PECS (Precision Etching Coating System) MANUAL

IMPORTANT! The samples must be dry and all the particles must be attached to the holder or carbon tape (without free particles that can be pulled by vacuum into the system).

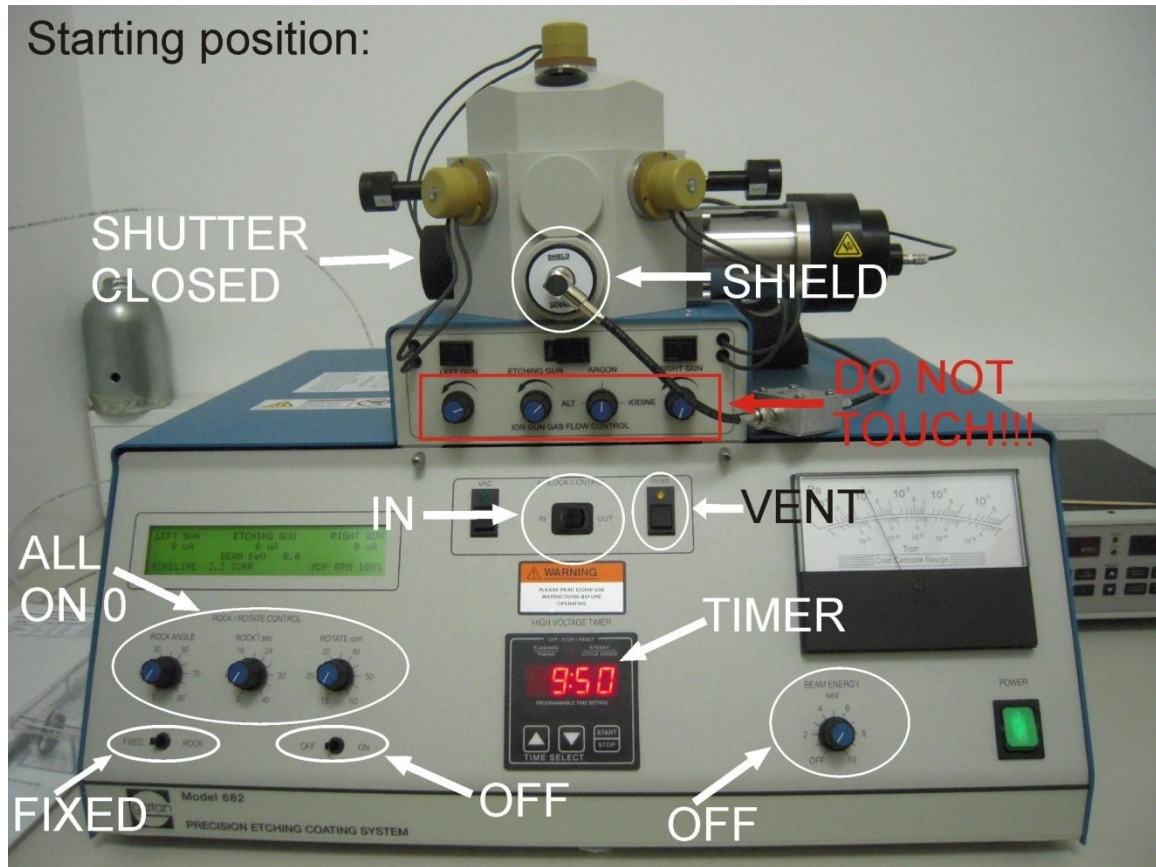


Figure 1: The initial position of the buttons on PECS.

LOADING THE SAMPLE

Before you start all potentiometers (ROCK, ROTATE, TILT) must be set to minimum, ROTATE switch on OFF and the other on FIXED. The pressure should be between 2 to $5 \cdot 10^{-4}$ Pa (Fig. 1)

Before loading the sample disconnect the cable for sample rotation (BE GENTLE!!).

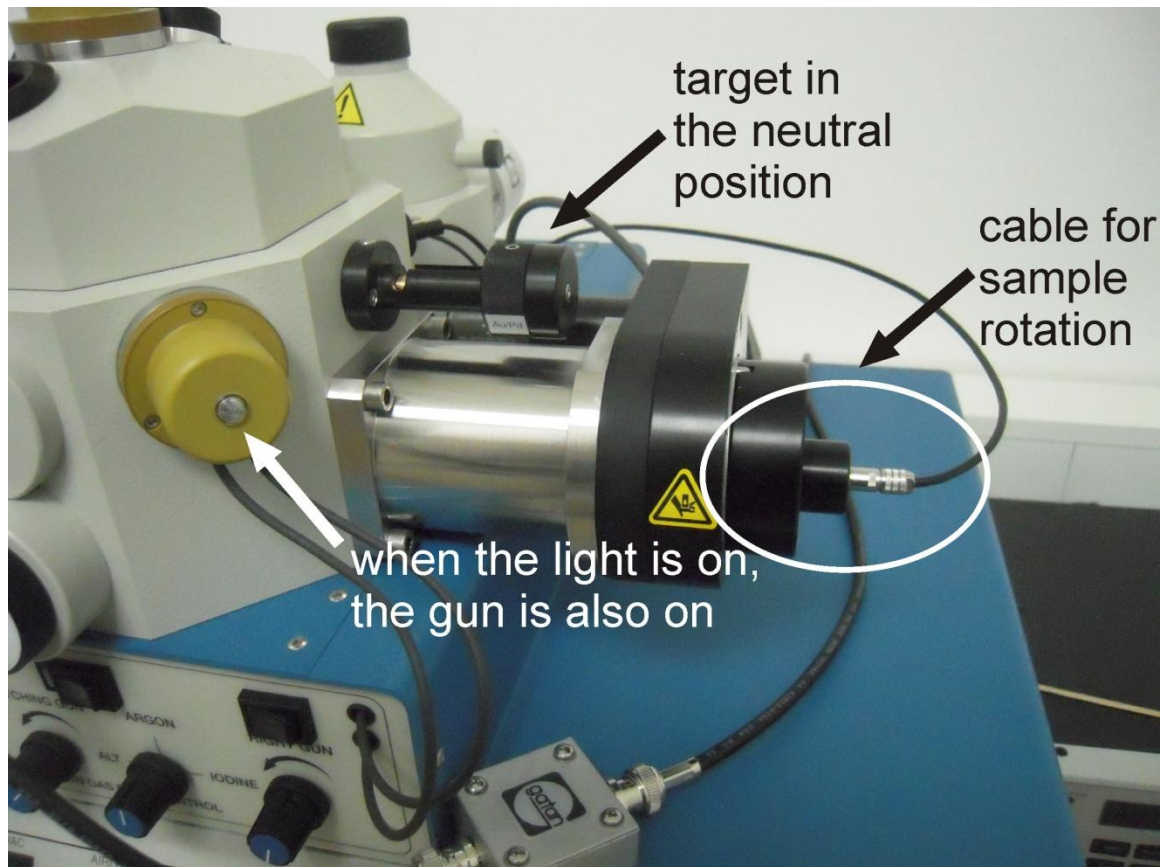


Figure 2: The sample holder.

- Switch the AIRLOCK CONTROL to OUT. Wait until the holder is moving from its working position to its Airlock position then press the VENT button.
- Slowly pull out the sample holder (rotate left/right) and place it to the holder carrier.
- Load the sample.
- Insert the sample holder into the Whisperlok (align the notches on the knob to the mating guide pins on the rock drive) and hold sample holder tightly to prevent air to come in when evacuation starts; see next step (VAC & IN).

- Switch ON the **VAC** switch once and wait until green light is off, then press AIRLOCK CONTROL to **IN** and push the sample holder gently in.

START-UP PROCEDURE

- The starting pressure in PECS chamber should be $< 10^{-3}$ Pa (call Zoran if the vacuum is not reached)
- The SHUTTER must be closed (the screw is in the bottom position)
- Turn on the THICKNESS MONITOR (the box on the right side of PECS) and select the number of target:
 1. for Carbon - C
 2. for Chromium – Cr (the coating parameters are specific, consult with Zoran before use)
 3. for Gold/Palladium - (Au/Pd)
 4. for Platinum – (Pt)
- Switch on the ion guns (right + left button, see Fig. 4). The vacuum pressure will drop because of the gas flow (DO NOT TOUCH the potentiometers for ION GAS FLOW CONTROL!)
- The SHIELD for measuring the layer thickness must be closed (shield position)
- Press STOP on THICKNESS MONITOR to reset the P-FAIL message
- Press START on THICKNESS MONITOR to reset the thickness to 0

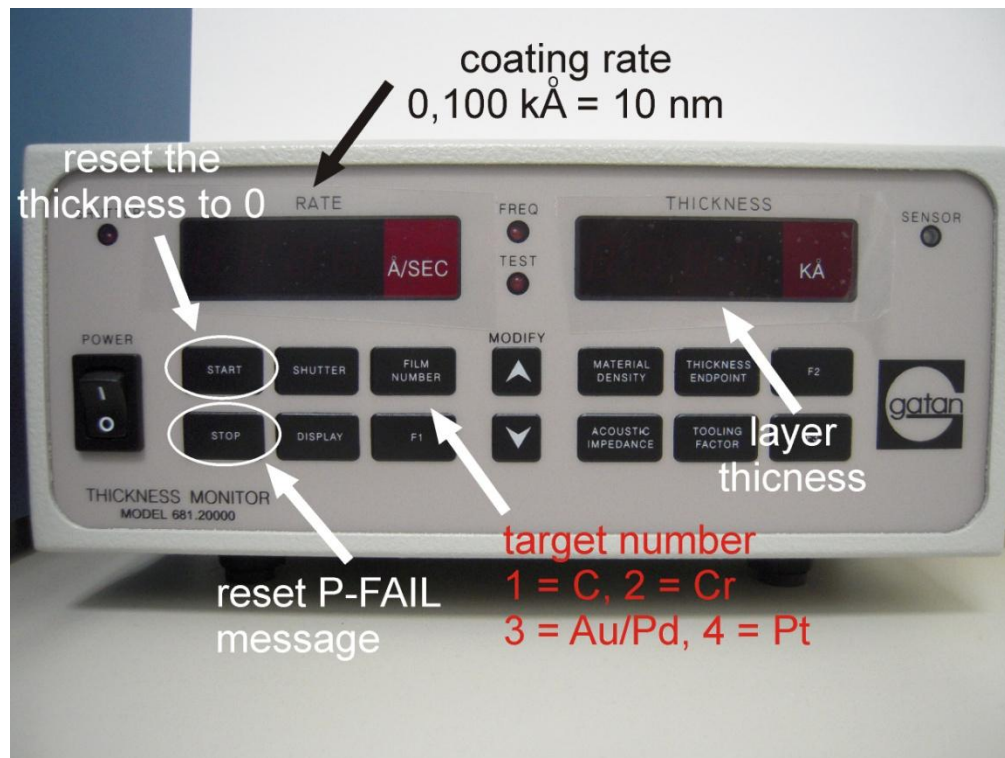


Figure 3: Thickness monitor.

SETTING the PARAMETERS

- Set the TIMER to 10 min
- Set the BEAM ENERGY to 5 keV (with the START/STOP button turn on the timer and high voltage) and wait for the current on the guns to appear. Then increase the BEAM ENERGY to 6 keV and wait for ~10 min that the time reaches 0 (this is to stabilize the ion guns)
- Both guns should have the approximately same current (within 10 % difference)
- Then restart the TIMER (hold the button TIMER) and set it again to 10 min, increase the BEAM ENERGY to 10 kV, press START/STOP button and wait for current > 400 μ A (but not more than 430 μ A)
- IMPORTANT!!!If the current at 10 kV is after 3 to 4 minutes of work still below 400 μ A, slowly adjust the valves for gas flow to maximize the current of each gun to about 425 μ A (consult with Zoran if you are unsure)
- When the current at 10 kV is stable (between 400 μ A and 430 μ A)set the desired voltage on the guns (we do not coat below 7kV, at higher voltage the coating rate is higher)
- For example, at 9 kV the current will drop to between 370 μ A and 400 μ A. Wait until it is stabilized. Write the final values of current for L and R gun in the workbook.
- When the current is ok, turn off the TIMER and reset it. SHUTTER and SHIELD are still closed
- Select the target material and insert the target into the chamber (the starting position of the screw is at the top, than turn it for 90° in CW or CCW). Press START on TIMER and wait 2 to 3 min (target cleaning)



Figure 4: Left: a control panel for the rotation and tilt of the sample and current and voltage monitor on the ion guns. Right: switches for ion guns, switch "Airlock Control" and "Vent".

COATING the SAMPLE

- If you wish you can switch ON and set the ROCK/ROTATE CONTROL, toggle the FIXED/ROCK switch to FIXED and rotate the ROCK ANGLE control to the desired angle.
- Start the coating: open SHUTTER and SHIELD (at the same time!!) and write down the time on TIMER. Observe the coating rate and thickness.

When you open the SHUTTER, the current on both guns drops to 0 and only if the current was really stable you can know the actual thickness.

- End the coating: Close the SHUTTER, check and write down the thickness on THICKNESS MONITOR and close the SHIELD, switch off the TIMER, reset the THICKNESS MONITOR, remove the target and turn it to neutral position (the upper screw)
- Shutter is closed, shield is closed; rotation to "0" and "off"; rock to 0; angle to "0" and "fixed"
- Reduce switch off the BEAM ENERGY to 0 kV (hear the "click")
- Switch off the ion guns

- Disconnect the sample rotation cable, switch the AIRLOCK CONTROL to OUT and press the VENT button when Airlock position is reached

- Take your sample, reinsert the sample holder into the Whisperlok (align the notches on the knob to the mating guide pins on the rock drive). Switch VAC on once and then the AIRLOCK CONTROL to IN and push the sample holder gently in

Use the notebook to enter your work. Report any problem in the comment section.