

# M-Probe XPS - Sputter Gun Manual

*Edited 2012-10-01 JAB*

## Preparing to sputter

1. Follow standard procedure for loading sample into analysis chamber.
2. Ensure that the analysis chamber pressure is in the  $10^{-9}$  Torr range.
3. Turn on the nti ion gun controller and check the following items:
  - a. All four interlock LEDs in the lower left are green.
  - b. Emission current is on standby.
  - c. Raster is set to ON.
  - d. Remote/local switch is set to REMOTE.
4. Slowly open the differential pumping line, watching that the pressure doesn't go above the  $10^{-8}$  Torr range and quickly returns to approximately the previous base pressure.
5. Open the Ar tank valve (see picture below).
6. Open the needle valve very slowly. Start by turning 1.5 turns ccw. This should not increase the pressure. At this point, slowly turn the valve until the pressure in the ion chamber is  $\sim 7$  mTorr. Be very careful, as the valve is highly sensitive. Be ready to turn it back cw if the pressure spikes.

## Ramping up the power supply

7. Navigate to an empty spot on the stub.
8. Turn on the ion gun in the ESCA control panel using the software.
9. Set the energy to the desired value (usually 3 keV), and set the appropriate values for the condenser, focus, and raster (see table below). Do not change the extractor or centering controls.
10. Ramp the current to 10 mA slowly over the course of two minutes, watching that the pressure in the chamber does not increase above the  $1-2 \times 10^{-7}$  range. Ensure that the beam on LED has turned green.
11. Turn off the ion gun using the ESCA control panel.

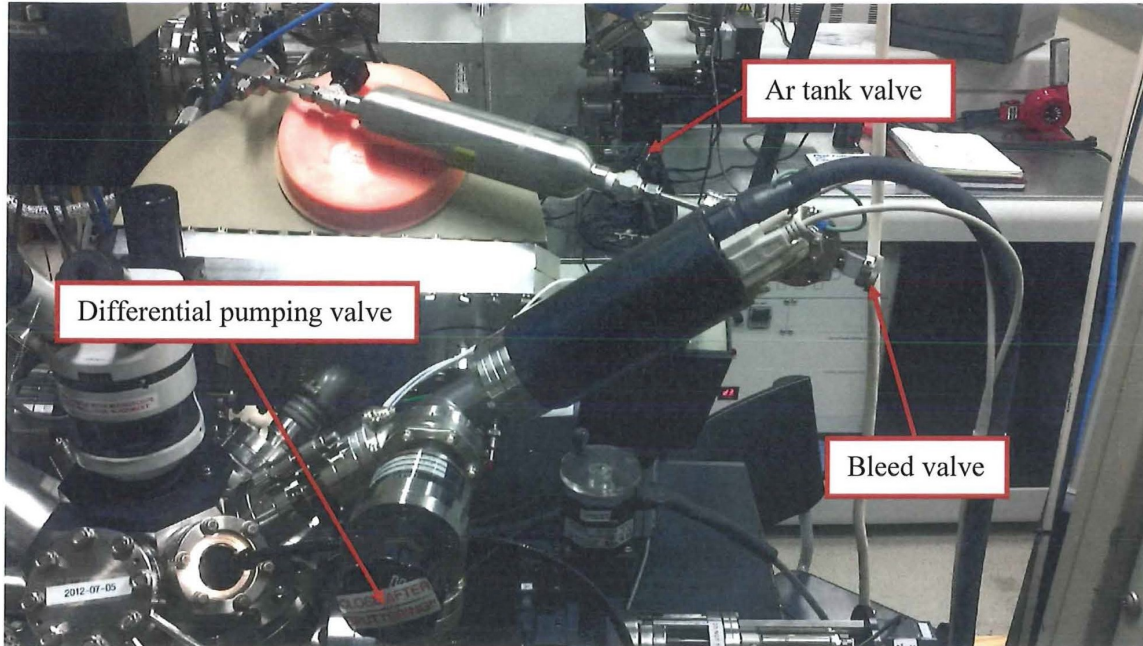
## Sputtering analysis spot

12. Navigate to the desired spot for analysis and set that position as home.
13. Sputter one of three ways:
  - a. Manually using the ion gun control on the ESCA control panel.

- b. Add an "Etch" step to a recipe by adding the desired sputter time in hh:mm:ss format. See table below for estimated etch rates.
  - c. Perform a depth profile experiment by selecting the Depth Profile recipe step. Click the pencil to define regions to scan, spot size, cycles, and etch time per cycle. Remember to add an off step after your depth profile to shut off the x-rays, the same as with a normal XPS run.
14. XPS can be performed while the chamber is still at pressure with Ar, but the ion gun control box on the ESCA control panel should not be checked. Scans should be performed at spot size 300 and resolution 2 to ensure that the x-ray beam is smaller than the sputtered area.

### **Shutting down**

- 15. Ensure that the ion gun control box on the ESCA control panel is not checked.
- 16. Ramp the current down to standby slowly.
- 17. Close bleed valve carefully. Stop when you feel resistance, do not overlighten (should be 2 turns cw, with the mark at 11 o'clock from the reference line). The valve does not need to be snug to be properly sealed.
- 18. Close Ar tank valve.
- 19. Wait 5 minutes for the ion chamber to clear and turn off the control box.
- 20. Close differential pumping line. This step is extremely important, so be sure to double check. Ensure that the pressure goes back to the initial base pressure.
- 21. Follow standard procedures for XPS or sample removal.



Energy keV	Focus V	Condenser V	Estimated Rate	
3	2617	244		2.5x raster 3.5y raster
2				
1				
0.05	-500	244		