## Introduction of the Parts of the MProbe

MProbe. Note the various pieces of the MProbe shown in Figure 1
 Overview of the MProbe XPS that shows the instrument to the left with
 parts labeled and the electronics rack to the right. Not shown to the left is
 the computer table. The two cryo-pumps that pump the load lock and the



Figure 1 Overview of the MProbe XPS that shows the instrument to the left with parts labeled and the electronics rack to the right. Not shown to the left is the computer table.

sample analysis chamber, SAC, the load lock where you load samples into

the instrument, the sample analysis chamber, The X-ray gun that shoots

electrons at an Al anode to generate X-rays, the monochromator that

chooses the Al K  $\alpha$  line and focuses it onto the sample, the analyzer that

sorts the energy of the photoemitted electrons before they hit the detector,

the sputter gun for cleaning samples, the turbo-pump controller used to turn on and off the vacuum pump for the load lock, LL, the control box that opens and closes the gate valves. There is only switch on the left hand side of the table shown with a little yellow tape that opens and closes the gate for the load lock cryo.

2. Figure 2, Note the turbo pump controller on the left, and the control box for opening and closing the gate valves and pressure gauges on the right.



Figure 2 Control boxes for the turbo pump, the gate valves, and the pressure gauges.

There are two pressure readout boxes on top of the Control Box. The top on show the pirani gauges for the back half of the load lock and the pressure of the rough pump that backs the turbo pump. Note that the pirani gauges only measure pressures above  $10^{-4}$  Torr if the pressure is lower than they read zero. The lower pressure box shows the ion gauges one for the load lock and one for the SAC and one for the LL. These gauges on show pressure  $<1 \times 10^{-4}$ . Torr and if the pressure is above this they must be turned off. The button under the pressure reading for the gauge is used to turn them on and off.



Figure 3 View into the load lock that shows the end of the transfer arm and the claw that holds the stub or puck with the sample.

- 3. View inside the load lock chamber showing the end of the transfer arm and the claw, Figure 3. When you open the LL you mount a stub on the claw and pump it down. After it is at low pressure you can use the transfer arm to move the Stage sample into the SAC. positon
- 4. The sample stub, Figure 4 Sample stub. Note the claw holds the stub where the red arrow indicates. The stage holds the stub at the black arrow.
- 5. Looking into the sample analysis chamber, SAC, showing the stub with the sample being pushed onto the stage. The sample is mounted on the top plate of the stub.



Figure 4 Sample stub. Note the claw holds the stub where the red arrow indicates.



Figure 5 View into sample analysis chamber that show the end of the transfer arm with a sample stub that is being mounted on the sample stage.

6. Figure 6 shows a student moving the transfer arm with the sample to the



Figure 6 Moving the sample from the LL to the SAC by the transfer arm.

- 7. Electronics rack that controls MProbe is shown in Figure 7.
  - a. All units marked except the sputter gun controller need to be on.
  - b. The spot size and resolution monitor show the spot size of the X-ray gun and the resolution of the detector when the X-rays are on.
  - c. The spectrometer power supply can be used to show voltages in the detector. Not normally important to the users.
  - d. The High voltage for the X-ray gun power supply can be used to show if the X-ray gun is ready for use (the KV meter at 10 KV, mA meter at 0 mA), or if the X-rays are on (the mA meter will show 2–20 mA). The mA meter reads different current for the different spot sizes.



Figure 7 Electronics rack for MProbe shown various modules.

SAC as she looks into the LL.

- e. The X-ray gun controller shows the spot size being used when X-rays are on. It also shows if the X-ray gun is controlled by the computer.
- 8. The High Voltage power supply that drives the X-ray gun is shown in

Figure 8. The picture shows that the gun is ready but is not producing any X-rays since no current is shown of the mA meter.

9. General procedure to use MProbe



Figure 8 High voltage power supply for the X-ray gun.

- a. Come into room and wash hands
- b. Fill out logbook on computer desk
- c. Observe MProbe for any signs of problems, pressures ok, no sample in SAC or LL, all electronics boxes on, data collection program running
- d. Put on gloves
- e. Get a Stub, clear it with IPA, and mount sample.
- f. Load stub into LL and wait for pressure to good down to 10<sup>-7-</sup> Torr
- g. Move sample into SAC and onto stage.
- h. Optimize signal and collect data.
- i. Move sample from SAC into LL and remove sample.
- j. Remove sample from stube, clean stub and put away.
- k. In logbook enter time for end of run.