

## Precision Ion Polishing System (PIPS) Manual

1. Turn on the power to the PIPS. Wait until the green LED light up.
2. When chamber pressure is  $< 5 \times 10^{-4}$  Torr, turn on the gas-valve switches for both guns.
3. Rotate the gas-flow control knobs CW to the fully closed position, and then back them off 3 full turns.
4. Turn ON the Ar gas flow to the PIPS.
5. With HV to the ion guns OFF, switch OFF the right gas control switch & leave the left ON.
6. Adjust the left needle valve to raise the chamber pressure to  $1 \times 10^{-4}$  Torr.
7. Switch OFF the left gas control switch.
8. Turn ON the right gas control switch.
9. Adjust the right valve to raise the chamber pressure to  $1 \times 10^{-4}$  Torr.
10. Switch ON both guns and **purge for about 15 mins.**
11. Turn OFF the gas-valve switch for the left gun and work only with the right gun.
12. Be sure beam modulator is turned OFF.
13. Set the rotate speed control dial to 3 (rpm).
14. Evacuate the airlock chamber by pressing the VAC button.
15. Toggle the airlock control button to lower the piston to its working position.
16. Set the HV timer to 30 minutes and press Start.
17. Adjust the ion gun voltage control until the beam energy display indicates 5.0 keV.
18. Adjust the right needle valve until the chamber pressure just enters the  $10^{-4}$  region.
19. Rotate the needle valve CW to reach the peak current. Rotate the needle valve CCW until the current drops by  $\sim 10\%$  to  $15\%$  of its maximum value (if peak current is  $45 \mu\text{A}$ , focused current is  $38\text{-}40 \mu\text{A}$ ). This completes the gas-flow adjustment of the right gun.
20. Repeat the procedure for the left gun (Turn OFF the right gun gas-valve switch & repeat for the left gun).
21. Turn both gas-valve switches ON when adjustment to both guns is completed.
22. Load the sample holder into the sample mount inside the working chamber & lower it to it the working position for ion milling.
23. Set the desired time interval on the digital process timer.
24. Toggle the beam modulation switch to "Single," "double," or "Off".
25. Press the "Start" button on the HV timer.
26. After milling is complete, take out the specimen, pump the system down and turn off the power. Close the main valve of the Ar gas cylinder.