

Short instructions for PIPS

ATTENTIONS

- Use argon gas: Q (**99,999 vol% Ar**)
- Water is open
- Argon is open

In general

- Vacuum is **10⁻²- 10⁻³ Pa**
- Table is in upper position (*airlock control*)
- Rotation **OFF**; value **0**
- Voltage (*ion gun*) **OFF**; value **0**
- Ion gun modulation is **OFF**
- Light on for VENT, ANGLE STATUS, MDP

Sample preparation

- Sample for ion milling has to be correctly prepared

Check!

- Thickness of the sample (measure thickness by dimple grinder or use optical microscope) has to be ~15 µm

Inserting sample into the holder and chamber

- Insert sample into sample holder
- Make sure that dimpled part is on the center of holder
- Hold **VENT** button and wait for few seconds
- Remove airlock cover
- Use special tweezers to load clamp-type sample holder into airlock
- Ensure long axis of holder is parallel with front panel of ion mill
- Replace airlock cover
- Hold **VAC** button and wait that green light will illuminate

Chamber pressure test and more

- Hold **DP TEST** button; on BEAM ENERGY display check the pressure (*3.2 Torr*)
- When value is 3.2, VAC illuminates green (*safe vacuum level*)
- Turn on rotation
- Switch Airlock control to lower sample into chamber (**LOWER**)
- Move microscope into the center of rotation
- Switch on monitor
- Microscope options:
 - Reflection illuminator; on the right
 - Transmission illuminator; button on left (down)

Start

Ion milling

- Rotate ion guns to desired angle (set up the angle)
- Set ion beam modulation
- Set sample rotation speed (*usually 2*)
- Press timer **START/STOP** (*usually 59:59*)

- Slowly increase voltage (usually till ~ 3.5 keV)

End of milling

- Decrease voltage to 0 keV
- Press timer **START/STOP**
- Turn off ion beam modulation (**OFF**)
- Switch Airlock control to upper sample into chamber (**UPPER**)
- Turn off rotation
- Hold VENT
- Remove airlock cover
- Remove sample holder

End of work

Vacuum the chamber

- Replace airlock cover
- Hold VAC button and wait that green light will illuminate

Cooling a sample with LN2

- Turn on **PIPS COLD STAGE CONTROLER**
- Fill the dewar with liquid nitrogen prior loading a sample into the PIPS
- Insert sample
- Replace the airlock cover
- Switch Airlock control to lower sample into chamber (**LOWER**)
- Wait till temperature reach -170 °C
- Start ion milling
- After milling switch Airlock control to upper sample into chamber (**UPPER**)
- Wait for 15minutes that sample heats
- Remove sample holder
- Turn **on** DEWAR HEATER (for ~ 30min)
- Turn **off** DEWAR HEATER
- Turn **off** PIPS COLD STAGE CONTROLER

»top-bottom« gun configuration

- Holders: DuoPost clamp-type
DuoPost glue-type
- Ion-beam modulator:
DOUBLE (guns switch on 2x in rotation)
SINGLE (guns switch on 1x in rotation)

»top-top« gun configuration

- Holders: DuoPost clamp-type
DuoPost glue-type
Cu-cooling holder
Mo-cooling holder
- Ion-beam modulator:
OFF (continual milling-only with post-type holder)
DOUBLE (guns switch on 2x in rotation)
SINGLE (guns switch on 1x in rotation)

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Problems

No values for guns (μA) on display

- Check the light on both guns during ion milling

No light on gun

- NO milling!

The hole is not on the center or two holes appeared

- Check if the dimple is on the center
- Guns are not aligned

Ion milling takes more than 3h

- Check the thickness of the sample (if the thickness is more than $20\mu\text{m}$, the sample is too thick)

More problems

- Ask CEMM