

Operating Procedure: VCR IBS/TM250 Ion Beam Sputterer

Ion Beam Sputter

The Ion Beam Sputter is designed to produce ultra-fine grain films of metal and carbon. These films are necessary to reveal details made visible by the greater resolving power of the newest generation of high resolution Scanning Electron Microscopes. These films are amorphous, uniform, continuous and conductive.

Ultra-thin films are produced by striking a target with ion beams from the two ion sources. The Ion beam from the Ion source and the plasma producing the beam are confined within the source and DO NOT interact with the specimen thus minimizing damage to the specimen. The Ion beams strike the target in a very small area. The sputterant is deposited onto the specimen surface at a very low energy. The specimen can be moved in a complex fashion, with the Independent Rotate & Tilt Stage (IRT Stage) thus ensuring uniform film deposition.

DIRECTIONS FOR USE

The IBS is always left under vacuum. The main power switch on the left side of the console should always be on and the cooling water should always be running.

Push the *Start* button to vent the chamber: the automatic sequence will shut down the turbo pump, vent the chamber with N₂ and turn off the vacuum gauge.

When the machine is vented: load the samples in the holder & place in the chamber. Use gloves to work in the vacuum chamber to keep it clean for faster pump down times.

Check the target – there are four targets available-lift and rotate the holder so the target you want to use is in front- the targets are marked on the back so you do not need to break the vacuum to check which target you are using.

Typical Targets Available

Iridium (FL1)

Small particle size, good for high resolution work, does not oxidize

Carbon (FL2)

Small particle size, does not sputter well but good for X-ray Analysis work

Chromium (FL3)

Small particle size, good for high resolution work but will oxidize quickly

Platinum (FL4)

Large particle size not recommended for high resolution work

Push the *Start* button to start the pumping of the chamber.

While the chamber is being pumped start the sample rotating & set up the film thickness monitor to the target material used to determine the amount of material deposited.

The Film Thickness Monitor is controlled by the Independent Rotate & Tilt Specimen Stage (IRT) button on the right side of the machine; just under the High voltage button. The IRT has the ability to tilt and/or rotate the specimen either together or independently. It is best to rotate the sample to obtain a uniform coating.

When you turn on the IRT power, the Film Thickness Monitor (FTM) will reset & the stage will tilt to 90° & back to normal.

Check the Data Entry that you are on the correct program for the material that you intend to sputter by pressing the *Program* button – for example FL1= Iridium (check with the list on the left side of the coater). If you are not on the correct program press the up /or down buttons till you are on the correct program- then press *Enter* then the *Program* button & continue.

One should always rotate the stage to ensure an even coating of your sample. If the sample has a lot of topography one should also tilt the sample.

There is a vacuum gauge directly below the *Start* button- wait at least 5 minutes then turn on the vacuum gauge by pressing the black button- wait till it is the 10⁻⁶ torr range before continuing.

- Turn on the HV power supply
- Turn on HV and Adjust the HV to 2-3 kV
- Open the argon leak valves- open one side first looking for a glow that the gun is on-then the other side(Or monitoring the current on the gauge).
- Running voltage 6-8 kV, current about 6 mA
- When you have the desired amount of material, TURN OFF the HV
- Turn off the HV power source
- Gently close the argon leak valves DO NOT OVER TIGHTEN
- Turn off the IRT stage
- VENT the chamber – Push the *Start* button
- Remove the sample from the chamber
- PUMP the chamber press the *Start* button.

ALWAYS LEAVE THE CHAMBER UNDER VACUUM

Emergency Information:

Medical Emergencies: **Contact 911 and Public Safety (609) 258-1000**

Room / facility emergencies: **Contact Public Safety (609) 258-1000**

Issues related to the instrument:

1. **Contact IAC Staff.**
2. **Leave system as is, Do Not disable vacuum system.**
3. **Try to shut off the High Tension/Close Vacuum valve.**

Audible/Siren Emergency Alerts:

Follow previous steps 2 & 3 and leave the building.

Emergency Contact Information:

Nan Yao: Office (609)258-6394; Cell (908) 922-2236 Email: nyao@princeton.edu

John Schreiber: Office (609)258-0034; Cell (215) 431-4670 Email: js51@princeton.edu

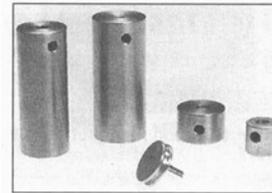
Paul Shao: Office (609)258-3851; Cell (847) 721-086 Email: pshao@princeton.edu

Scanning Electron Microscopy Supplies

Pin Mount Stub Adapters *J e J J!*

Made from aluminum, used to adapt 1/8" (3.1mm) pin diameter SEM stubs.
Available in 10, 15 and 16mm diameters.

- 75940 10 Pin Stub Adapter 10mm(H)x10mm(D) each
- 75940-11 Pin Stub Adapter 15mm(H)x10mm(D) each
- 75940-15 Pin Stub Adapter 38mm(H)x15mm(D) each
- 75940-16 Pin Stub Adapter 38mm(H)x16mm(D) each



Cross Sectional Holder *.}eJ}.*

Made from non-magnetic stainless steel with 3.1mm (") diameter pin and adjustable angle turn-screw. Just insert specimens edge-on and observe the cross section directly.

- 75942.01 Cross Sectional Holder each



Four-Pin Stub Holder *.}eJ}.*

It accommodates four pin types, up to 12.5 (") surface specimen stubs, with- (3.1mm) diameter pin.

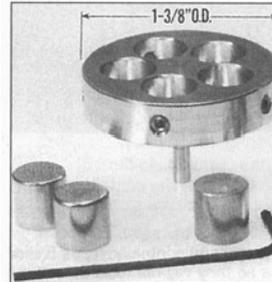
- 75944-04 Four-Pin Stub Holder each



Five 10mm Stub Holder *.}e#.*

Accommodates five 10mm diameter specimen stubs, with- (3.1mm) diameter pin.

- 75945-05 Five 10 mm Stub Holder each



Thin Sample Holder *.}eJ}.*

Ideal for the examination of cross sections of thin samples, such as wafers, multi-layer of capacitors, plastics, metals, etc.

1. For most AMRAY: - diameter (12.7mm) - (3.1mm) diameter pin (3.1mm) with split openings up to - (6.4mm). Available with either 5mm (") pin height or 15mm (") pin height.
2. For ISI, JEOL, TOPCON: Double set screw for a secure holding of the specimen during observation. 15mm (") (dia.) x 10mm (") (H), 6.4mm (") split.

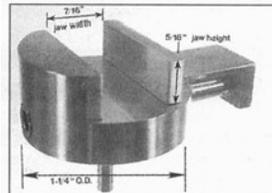
- 75948-08 Thin Film Holder, 5mm (L) Pin each
- 75948-15 Thin Film Holder, 15mm (L) Pin each
- 75948-10 Thin Film Holder, 15x10mm Stub each



Universal Vise *.}eJ}.*

A single set screw loading vise for fast and easy to hold specimens for SEM. The jaws are 1" (25mm) long, .5" (11mm) wide and .5" (8mm) high. (3.1mm) pin.

- 75950-01 Universal Vise each



Special Grids for SEM

Finder grids for SEM; a valuable tool for analytical studies. The grids are available in 10mm diameter and they can be placed directly on the stub surface and used to identify the area of interest in which the studies are performed.

- 80100-Cu SEM, Finder Grids, Copper each
- 80100-Ni SEM, Finder Grids, Nickel each



SUPPLIERS FOR ELECTRON MICROSCOPY

Electron Microscopy Sciences

www.emsdiasum.com

800-523-5874

SEM Aluminum Mounts for the XL-30

Standard Mounts

Tapered end pin

Slotted head ½ " dia(12.7mm) Pin 1/8" dis (3.1mm)

Cat. # 75200	Pk of 10	\$ 5.00
Cat. # 75210	Pk of 50	\$ 12.00
Cat. # 75220	Pk of 100	\$ 20.00
Cat. # 75230	Pk of 500	\$ 95.00

Angled Specimen Mounts 45° Pin Mount

Cat. # 75240 Pk of 10 \$ 13.00

Cat. # 75242 Pk of 50 \$ 62.00

Carbon Adhesive Tabs 12mm

Cat. # 77825-12 100 \$ 17.00

Specimen Mount Boxes + Inserts for Pin Mounts

Cat. 76600	each	\$ 2.25
	Pk of 10	\$ 21.50
	Pk of 100	\$ 200.00

Ted Pella Inc

www.tedpella.com

800-237-3526

SEM Aluminum Mounts for the XL-30

Standard Mounts

Tapered End Pin

Slotted head ½ " dia(12.7mm), Pin 1/8" dia (3.1mm)

Cat. # 16111	Pk of 50	\$ 12.00
	Pk of 100	\$ 19.00
	Pk of 500	\$ 90.00

Angled Specimen Mounts 45° (Pin Mount)

Cat. # 16101 Pk of 10 \$ 11.90

Pk of 100 \$ 95.00

Carbon Tabs

Cat. # 16084-1 Pk of 100 \$ 14.50

Specimen Mount Boxes with Inserts for Pin Mounts

Cat. # 16120	each	\$ 1.80
	Pk of 100	\$ 135.00