

FEI Verios 460XHR Operation Procedure

General cautions:

- 1: The SEM lab is used assuming "operating room" cleanliness, i.e., the SEM lab is a high visibility lab and must be kept clean and neat so clean up behind yourself.
- 2: The SEM and all associated instruments are ultra-high vacuum grade equipment, i.e., use gloves when handling samples, sample holders, the sample shuttle, tweezers, tools, and any other object that is going into the SEM or will touch anything that is going in the SEM.

Computer Logon credentials: (User Name = User) (password = Verios460)

Sample Mounting: (Video on desktop for sample insertion directions)

*** Sample stubs should be clean and free of residual hydrocarbons, and samples should be minimally volatile and free from contaminants.**

For large samples: Venting entire chamber (Sample height greater than 9mm)

You have to vent the whole chamber, open the big chamber door and mount the sample holder onto the stage directly, just as you do on Quanta ESEM or XL30.

For small samples: Quick Load Lock (Sample height below 9mm)

- 1: Mount SEM stubs in the shuttle, tighten set screw gently (finger tight!) with allen driver, making sure stub pin doesn't protrude the bottom of the shuttle.
- 3: Sample height should be checked with the **Sample Gauge**.
- 4: Select "V" on the Quick Loader to vent the small chamber.
- 5: Open lid of chamber. Slide in transfer arm and attached sample shuttle– which uses a bayonet coupling. Once locked in, retract transfer arm back to **Rest** position.
- 6: Close chamber lid, select "P" to pump chamber and wait till "OK" lights up. About 5 seconds after light comes on, you will hear a click, after which you can open the gate valve and lock open.
7. Slide transfer with sample into main chamber onto the stage. Turning arm down to release, pull back to remove from shuttle, turn up and retract transfer arm from chamber. Lock into **Rest** position.
8. Close gate valve

Preparing to turn on the beam:

- 1: Confirm vacuum is **5*10⁻⁶ torr** or less before turning on the beam

2: Under pull down menu of “stage”, choose “take NavCam photo”, a picture of your sample on the shuttle should be taken and shown in the lower left quad. (NavCam is a camera that is used to assist the operator in navigating and placing the electron beam at a specific location of interest on a sample).

3: Double click on the sample of interest in NavCam image to place the sample under the beam.

4: SEM is initially set for mode 1 operation –the optimum working distance will be ~ 4mm.

Imaging: (3 Modes of Imaging)

***depending on the Mode, you will notice that you will have certain ranges of kv and beam currents. Plus WD will effect these ranges too.**

Mode 1: (Field Free) – used for mags below 100kX.

-no limitation on kv, WD, or Beam current.

Mode 2: (Immersion) – used for mags above 100kX and Low kv.

-5kv or less, limitation on WD and Beam current.

(* NO MAGNETIC SAMPLES for this mode)

Mode 3: (EDX) – used mainly for X-ray analysis.

-image quality is good but designed for X-ray performance.

1: Turn on the beam: start with 5kv and beam current of 25pA.

2: Click on quad1 to make it active, then un-pause the acquisition. Check that this is set to the detector you wish to use.

3: Reduce magnification and find the region of interest. Check for charging and if necessary lower kv.

4: Adjust Contrast and Brightness - this can be done manually or automatically (click on ACB button). Redo ACB whenever you change Mag or kv.

5: Focus on your features.

6: Link stage and check that the link was successful, i.e., the stage position and WD in data bar match.

7: Decrease working distance to 4 mm. (Shorter working distances make better high resolution images. Longer working distances make better depth of field).

8: **U Mode Alignment** – Alignment tab- select (E-Column: UC User Alignments), select only the [U Mode Source Centering] box, select the [Automatic] Box, then run selection. Select the Finish but when complete (about 2minutes).

9: Always check the beam (Cross-Over) when changing gun parameters. Re-center beam to center of screen.

10: Adjust the **HV Modulator**. Select a mag in the range of 30-50kX. Adjust by minimizing the lateral movement of the image.

11: Correct Focus

12: Adjust stigmatism (most easily at higher magnifications). Also select "Reduced Area" window and slow scan speed.

13: Repeat steps 9-12 until you have a reasonable image.

14. Acquiring image: You can use the **Image Acquisition** icon (Camera Symbol)at the top of the User Interface or "Pause" the image and select the "Save as" function in the File menu.

15. Saving Images: Save your images in the "shortcut to Verios SharedData" folder located on the Desktop.

Finishing your session:

1: Pause the active acquisition(s)

3: Turn beam off

4: Make sure that CCD camera is live (i.e., un-paused)

5: Retract any movable detectors (CBS, EDS, or STEM)

6: Zero the stage tilt and scan rotation

REMOVING Sample from SEM:

7: Select "P" on Quick Loader

8: Once light on "P" goes out, Open Gate Valve and lock into position.

9: Insert Rod, turn handle down to insert tip into stage, then turn handle up to lock in.

10: Retract Rod from chamber and lock into **Rest** position. (VERY IMPORTANT)

11: Close Gate Valve and lock into position.

12: Select "V" on Quick Loader to vent chamber, Lift Lid, and remove sample shuttle from Rod.

13: Close lid of Quick Loader and Select "P" to pump on Quick Loader.

14: Remove sample stub from Shuttle and store Shuttle in Dry Box.

15: Clean up area and fill out Log Book.

16: Log off system in Hallway.

17: Access images and Data from Computer Room ACEE room 027D.

DO NOT USE THE SEM COMPUTERS FOR ANYTHING BUT RUNNING THE MICROSCOPE-IF YOU NEED TO GO ONLINE OR CHECK YOUR EMAIL USE ONE OF THE COMPUTERS IN THE CENTRAL FACILITY!

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.

Audible/Siren Emergency Alerts:

Follow previous steps 2 & 3 and leave the building.

Emergency Contact Information:

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