Operating Procedures for SEM2
FEI XL30 ESEM - High Vacuum Mode

Start-Up

1) Sign in usage via the support computer.

2) If Scandium is not up on the middle monitor, double-click button.

3) Click on the CCD button in Microscope Control (if not already yellow). This will give you a view of the sample chamber on the screen.

4) Check and if necessary adjust X (0), Y (0), Rotation (0), Tilt (0) and Z (15-20mm).

5) Select the Vent button in the Vacuum control box. Click OK in the dialog box and wait for the vacuum Idle message. It will take about 3mins for the chamber to vent.

6) Put on gloves and carefully open the chamber with handle. Place the specimen stub on the stage.

7) Check the height with the “elephant ear” gauge. The top of the sample should be just below the bottom of the “trunk”. If it is not, lower the stage with the Z knob.

8) Carefully close the door – watch the monitor to be sure the sample does not hit anything.

9) Be sure the lever on the black manual valve behind the microscope column is at HVAC position.

10) Press the Pump button.

11) Go to the Detectors menu and select SE.

12) From the Beam menu, select an appropriate kV (e.g. 1-30 kV) and set the spot size to 5

13) From the Scan menu, select Slow Scan 1.

Imaging samples

14) Once you see Vacuum OK (below the Pump button), click the kV button in the Beam control group. Wait for the μA reading to stabilize. Do not remove the Confirm Focus message.

15) Click the Autocontrast button or modify the brightness and contrast using the sliders.

16) Magnification can be adjusted using the +/- keys on the numeric keypad, in the Magnification menu, or by clicking in the inner circle in mode.

17) Focus by pressing the RIGHT mouse button and dragging to left or right. Selecting the Selected area box and Slow Scan 2 may be helpful.

18) Once the sample is in focus, click OK on the Confirm Focus window. If at any time the WD on the databar does not match the Z in the Stage control box, click on the Z<=>FWD button to link them.

19) Move the sample using one of the following methods (click and hold in the direction you want to move the stage), (double click will bring that point to center), or arrows on the keyboard. Rotate using the R knob on chamber door, or adjust R field in Stage control group.

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20) Adjust the working distance of the sample by typing a value in the Z box or by turning the Z knob on the front of the SEM. The optimal working distance for the SE detector is between 10-12mm. When changing the working distance, use the CCD view to ensure the sample does not hit the pole piece. The pole piece is very expensive and not covered under the service contract.

21) Correct the astigmatism if necessary and only if you are above 10,000x. Access the stigmator function by pressing the SHIFT and right mouse button together. Move the cross hair left to right and top to bottom until the image improves. Try to make the edges in the image as sharp as possible.

22) Adjust Spot Size if necessary (e.g., try 4 @ >10000x). A smaller spot size will give better resolution, but a grainier image.

23) To acquire a digital image, press F2 for standard definition images (338KB) or press F5 for high definition images (5MB).

24) For an F2 capture, wait for the button to turn yellow. Then click on the Scandium toolbar to transfer the image. The image will not freeze when collection is complete for an F5 capture. Click to bring the high definition images in to Scandium.

25) Click to have the data bar at bottom of the image. To burn the scale bar on to the image, click . To preview the scale bar on the image, click .

26) To save the images, click . Select UserImages on the F drive. Type file name, press Enter.

27) If you have used an F2 capture, click off to revert to a live scan. An F5 capture will automatically go back to a live scan.

28) Tilting the stage must be done manually. Adjust the stage height to at least a 15mm working distance. Then unlock the stage and while holding the stage handle, move the stage to the desired tilt angle. Then relock the stage. Always watch the tilting procedure on the CCD camera to be sure the sample does not hit the pole piece. The pole piece is very expensive and not covered under the service contract.

Leaving the SEM for the Next User

29) Decrease the magnification to the minimum value.

30) In the Beam control group, click the kV button to turn the filament off.

31) Click the CCD button to view the inside of the chamber.

32) Set stage Tilt to 0, Z to >15mm, X, Y, R to 0.

33) In the Vacuum control group, click the Vent button and wait for Idle message.

34) Carefully open chamber, with handle, and remove samples (wear gloves).

35) Close door and hold shut. In the Vacuum control group, select Pump. Wait for Vacuum OK status, then go to the Vacuum control group and select RPM 70%.

36) Remove images from the support computer via e-mail or storage media. Then Close Scandium.

37) Sign out of the usage log via the computer