

FEI Nova 200 NanoSEM Operation Notes

Standby Condition

- High Voltage OFF.
- Vent the chamber to recover the specimen then pump down to high-vacuum mode (chamber pressure $< 1 \times 10^{-4}$ torr)
- Logout xT software and record sign the usage check list. Note problems if any.

Sample Changing

- Verify your sample is clean. If possible, bake samples at 80°C before loading.
- High Voltage OFF, lower the stage to lowest position then vent the chamber. It takes ~1 minute to vent. It only requires 0.2 mbar to vent the chamber. **Do NOT change the gas regulator.**
- Load the sample on stage. **Verify that sample is at or below the 5mm position using the height gauge** when the stage is at midrange. Adjust screw if necessary.
- Close door slowly while looking at live CCD image to **make sure that the specimen will NOT hit the pole piece (700,000-NTD worth)**. Hold the door closed and select Pump.

Startup

- Log into WinXP and start xT services if necessary. The username and password is the same for both WinXP and xT user interface (UI). In case of the xT service failed to start, reboot the computer.
- Log into xT user interface.
- Load sample and **use the height gauge to make sure the sample is at ~5 mm position** then close door for pumping down. This should take less than 4 minutes.
- **Sample should be below 5 mm working distance.** Use z-height to bring sample up to near (but still below) 5 mm marker.
- Wait for vacuum $< 1 \times 10^{-4}$ torr before applying high voltage. After the HV has ramped up, select desire detector and unpause scanning to begin imaging. **Record the vacuum mode, beam parameters, and vacuum pressure on the check list.**
- Select ACB then adjust image brightness and contrast as desired.
- Focus image and set link Z to working distance, set eucentric height (5mm FWD). **Record the sample composition and working distance on the check list.**
- Choose your scanning conditions by selecting high voltage, spot size, dwell time, image resolution, and image averaging.
- Fine focus and tune stigmator to get clearest image at desire magnifications.

SEM Modes




- Mode 1: Field-Free (HR): standard SEM imaging mode. Use *ETD* to image.
- Mode 2: Immersion (UHR): immersion lens mode for high resolution ($> 2k\times$ mag, $< 18kV$ at 5mm FWD).
- Mode 3: EDX: semi-immersion lens mode for improved EDX analyses.

Oxford INCA EDS Operation Notes

General

- Make sure the green and blue LED on the detector is continuous lit.
- Check the detector position. Insert or retract the detector in Options → Detector Control → Slide. If the detector is to be moved, prepare to press “stop” and observe the movement to make sure that the detector head is not hit.
- **This detector is NOT compatible with BSED and LVD.** If low-vacuum or backscattered electrons are to be used, retract the detector before mount the detector on the pole piece.
- The detector line-of-sight converges with the e-beam at 5mm working distance. To get the best result, adjust the working distance to 5mm.

Spectrum Acquisition (Analyzer function)

- **Turn off the IR camera to avoid saturation to the detector at ~0 keV.**
- In “Microscope Setup” block, start an acquisition with  then tune the *beam voltage*, *beam current (spot size)* on the microscope and *process time* in INCA to make sure the **Deadtime is <50%**. Set higher (6) process time will give better spectrum resolution but higher deadtime. Increasing the beam current or voltage will increase the count rate but higher deadtime.
- In “Acquire Spectra” block, set the *termination of acquisition* according to desired time or signal intensity.
- Start the acquisition. If a warning about *Quant Optimization* pop-up, it is safe to press “Retry” and set for Don’t warn again because this optimization is only useful if there is a suitable standard.
- The software will automatically label identified elements. It is possible to add or remove elements in the “Confirm Elements” block by double-click on the periodic table. Single-click will reveal the theoretical position of the element and  can be useful for identifying unknown peaks.
- The view of spectrum can be panned by drag the spectrum. The X-axis can be scaled by scroll the spectrum. The yellow/blue background in the spectrum can be removed by right-click and select line draw.
- In the “Report” block, select desired template. The name of the spectrum can be edited and will show in the report.
- It is **not** possible to export the spectrum into text file for other software.  can be used to export current report into Word file for storing the result. It is suggested to save the project in case different report needs to be generated.
- In the “Site of Interest” block of “Point & ID” function, image can be acquired and by clicking on the image (or define region-of-interest), spectrum of different location can be acquired. If the spectrum is associated with an image, they can be marked on the report.