

This quick guide provides a brief introduction to handling the correlative probe and electron microscopy, model LiteScope™. For more details, the user is encouraged to visit the manual on the official NenoVision webpage.

## LiteScope (Correlative Probe and Electron Microscope: CPEM)

**Note:** Prior to using the LiteScope, the user confirms that he/she has already been granted MIRA3-XMU certification.

### Installing the scanning head

1. Vent and then open the SEM chamber.
2. Move the SEM stage to the installation position X:Y:Z → 10:-65:65
3. **Carefully** remove the SEM rotating stage:
  - a. Unplug the cable of the motor.
  - b. Remove stage screws (there are three screws).
  - c. Safely put the stage in the SEM chamber's right-back corner to avoid any collision during the stage movement.
4. Install the LiteScope scanning head:
  - a. Using three screws, fix the scanning head on the SEM stage.
  - b. Plug in two LiteScope cables to the corresponding feedthroughs inside the SEM chamber (check the cable head pins).
  - c. First, mount the probe and then sample at a safe distance to avoid crashing the tip.

### Running the NanoView software:

1. In the Chrome address bar, insert the CEITEC IP address and log in with your credentials.
2. In the interface window, click *Lock Scanner* to disable any action for external users, then click *Online* in *Power* tab.
3. If necessary, adjust the macro motor positioning.
4. Go to *File\New Project* and type in your folder name.
5. From the *Layout* tab, select *Akiyama* and click *YES*.
6. Tune the probe by clicking on *start* in *Measurement\Sweep setting* to verify that the probe is mounted correctly.
7. Using the *Macro motors*, move the tip to the region of interest, close the door, and pump the chamber to reach the vacuum.

### Setting up the measurement:

1. Navigate the sample to find the region of interest and move the tip to that region using the macro motors.
2. Tune the probe
  - a. Go to *Measurement\PLL\Sweep settings*, there click on *Auto repeat*, and on *Show history*, then click on *Start*.
  - b. Adjust the *Tuning fork compensation* and redo the frequency sweeping to obtain a symmetric resonance profile.
  - c. Repeat the previous step until a sharp and symmetric peak (Tuning fork compensation ~0.3 – 0.6 V) is obtained.
  - d. The Frequency range should be ~100 Hz, peak amplitude ~0.4 – 0.5 V, and *Freq. shift* ~0 V.
  - e. When the requirements meet the condition, click on *Auto PLL* to activate the PLL feedback.
3. If the *freq. Shift* oscillates in larger values, try to tune the probe's resonance frequency until the *freq. shift* is ~0 V.
4. Go back to the *Scan* tab, tick *Autosave as* and write the measurement name, then click on *Save now*.
5. Click *Start* in *Macro motors* to autoapproach until the tip is in contact with the surface.
6. Use smaller steps when the probe is close to the sample.

### Imaging

1. Upon your need, set the scanning parameters in the *Scan Setting*.
2. In the *Scan control*, click *Start* to run the scan.
3. Tick the *Slop correction* in *Slope & drift correction* and tune the slope compensation.
4. In the *Feedback AFM* tab, tune the *CI* (0.5–25), *CP* (1–30) and *Setpoint* (50–30 Hz) parameters for better acceptable imaging. Generally, for smooth surfaces, lower CI, and higher setpoint, and for rough surfaces, the vice versa is recommended.
5. After the measurement is done, the image will be saved automatically (if *Autosave as* is ticked); however, the user can save it during the measurement by clicking on the *Save now*.
6. To measure another area of the same sample, if needed, click on *Retract* in *Macro motors*.

After your experiment is done, click *Retract* in *Macro motors* and move the stage to WD ~25 mm. Then retract the tip 1–2 mm, using *Z axis* (*Z+* up). Turn off the SEM electron beam and vent the chamber. Move the stage to the installation position X:Y:Z → 10:-65:65. After removing the sample and probe, return the LiteScope to *Standby* mode and log off. Carefully unplug the feedthrough cables and then unmount the LiteScope from the stage. Install the SEM rotating stage and reconnect the motor cable. After making sure the stage motor works properly, vacuum the SEM and put it in standby mode.