

*This guide obtains just brief information. In case you need detailed instructions, read chapter "Getting Started" in TESCAN LYRA3 manual. It is recommended to read the **Safety Instruction and Basic Troubleshooting** manual prior to your work.*

1071 TESCAN Lyra3 SEM

Getting SEM Image

1. Type your user name and password in **LyraTC - Log in** screen.
 2. Vent the microscope by using the **VENT** button on the Vacuum panel. Wait until the pressure is at the atmospheric level.
 3. Select the position for uploading your sample by clicking on the appropriate number button on the carousel in the **Stage Control** panel. **Wear gloves!** Use dry nitrogen to clean sample. Open the chamber door and load your sample.
 4. Close chamber door and press **PUMP** button on the **Vacuum** panel. Wait until pressure indicator bar turns from red to green.
 5. Load the actual SEM configuration file via "**Options**" in main menu **Configurations ► Load** from "NEW PRESETS" folder placed on the desktop.
 6. Click on the appropriate number button on the carousel in the **Stage Control** panel where you have placed your sample to move it under the SEM objective.
 7. Click on the **BEAM ON** button on the **Electron Beam** panel to turn the electron beam on.
 8. Magnify and focus properly at your specimen. Use **Degauss** function to be sure you stay in focus. If not, repeat the procedure. Magnify at least to 40kx and repeat the focusing procedure.
 9. Go to WD 9 mm using **WD&Z** function in **Stage Control** panel. It is recommended to move in two or three steps when the change in WD is large. Place the cursor over **Stop** button and watch **Chamber View** when the stage is moving. Hit the **Stop** button immediately when it seems there might be a collision!
 10. Choose HV you will use: click **HV:** in **Info Panel** and type desired value of the accelerating voltage (e.g. 20 kV) to **Pad** panel.
 11. Check that you are in **RESOLUTION** mode and you are using **SE detector** (Uncheck the **Continual Wide Field** function).
 12. In the case you have chosen voltage different then 2, 5, 10 or 20 kV: set the minimum magnification. Check there is no charging or Faraday cup in your image or move to ADJ sample or clean stub and focus. In Electron beam panel click on **Adjustment >>>** and choose **Auto gun centering** function.
 13. Click on **Spot Size:** in **Info Panel** and type 0 value to **Pad** panel. Minimum spot size and optimum beam intensity will be set automatically for current HV and WD.
 14. Placing the cursor over the **SEM Scanning window** and clicking the mouse wheel move area of interest into the centre of the image.
 15. Set the desired view field and focus the image. In the case that the image is moving during focusing, it is necessary to check the centering of the objective. Go for **Adjustment >>>** and **Manual Column Centering**. (Hold down the F12 key to change only X movement at the Trackball, and the F11 key to change only Y movement).
 16. Correct astigmatism. In case that the image is moving when stigmating, click on **SEM** in the main menu and choose **Stigmators A/B centering**. Follow the procedure.
 17. Select a suitable scanning speed (at least 5, but 7 is recommended). Clicking on the **Acquire** button saves the image.
- When finished:**
18. Once finished set the HV to **5 kV**, withdraw samples and **evacuate chamber**. In case you are last user today, put the SEM to standby mode (click on **STANDBY** button on the Vacuum panel). **Log off** and leave **LyraTC - Log in** screen on.

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FIB Imaging and Basic Etching

1. Go to **WD&Z 20 mm**, tick the **Keep view field** checkbox and tilt the sample stage to **55 degrees**.
2. Refocus and go to **WD&Z 9 mm**.
3. Select the **FIB Beam Energy** (30 keV recommended) using the combo box in the **Ion Beam** panel or use the **Pad** panel
4. Turn on the high voltage by clicking on the **High voltage** button on the Ion Beam panel. Wait until the voltage reaches the set value.
5. Start emission by clicking **Emission** button.
6. Open the **FIB Presets** panel and choose the preset for imaging.
7. Tick **Lock FIB and SEM view field** checkbox in the Ion Beam panel and set **minimum magnification** in FIB Scanning Window.
8. Use the **Auto Brightness/Contrast** function in FIB scanning window and focus the FIB image. Keep in mind that ion imaging is destructive for your sample!
9. Rescan SEM image window and locate an easy recognizable object in the middle by means of stage movement.
10. Open the **FIB-SEM Intersection** panel from the FIB main menu and follow the procedure. Same object should be also in the middle of the FIB scanning window.
11. Adjust preset for ion current you plan to work with (focus, FIB centering, Stigmators, Stigmators centering) and don't forget to save your settings (**Save Preset**).
12. Open the **DrawBeam** panel from the Tools menu.
13. Load or create your project. Set the layers according the process (e.g. I-Etching)
14. Click on the  icon in the **DrawBeam** panel to open the DrawBeam Process panel.
15. Select the **Layer** to be processed and appropriate **Preset** (preset can be the actual or other user-defined FIB settings). Measure **Beam current** and choose **Material** (or leave default material, it is possible to calibrate etching parameters afterwards).
16. Click the  button to start process.

When finished:

17. Turn off the FIB emission and high voltage. Go to **WD&Z 17 mm** and tilt the sample stage to **0 degrees**. Set the SEM HV to **5 kV**, withdraw samples and **evacuate chamber**. In case you are last user today, put the SEM to standby mode (click on **STANDBY** button on the Vacuum panel). **Log off** and leave in **LyraTC - Log in** screen on.