

## TESCAN LYRA3 FIB-SEM

### Safety instructions and Troubleshooting

#### Basics

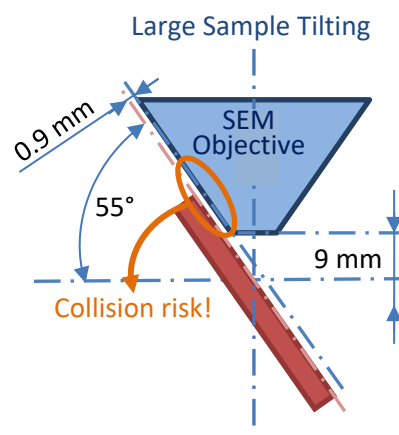
- Never use the microscope including (FIB, GIS, EDS, nanomanipulators) if you are not allowed to.
- Never open the housing with the electronics or manipulate with the instrument parts (e.g. detectors, cables).

#### Safe Sample Loading Procedure

- Always wear gloves!
- The samples should be cleaned and dried prior to loading them to SEM chamber. Think of possible contamination!
- Blow your samples by compressed nitrogen or dry air especially in the case of powder samples.
- Move with the SEM stage to the sample exchange position (via red number buttons on the carousel in the Stage Control panel).
- Make sure that the sample is fixed to the specimen stub/holder (turn it upside down) and that stub/holder is tightened to the SEM stage properly (but not overtightened).

#### Safe Stage Movements

- Check that you are in perfect focus by using degauss function (image should stay in focus after that) before moving at large distances via WD&Z function. There is a collision risk with SEM/FIB objective, GIS nozzles or RBSE detector!
- 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!
- Rotate and tilt before approaching to SEM objective. If you are very close to the objective, move down with the stage and then rotate or tilt it.
- When you are tilting a large sample, make sure that the outer limb of your sample is flat to avoid collision with SEM (see the scheme)
- Check if the “Keep view field” function is active - the stage movement is different with and without this function!
- The touch alarm doesn't work if the sample is nonconductive!



#### No SEM Image

- Check that Electron beam is ON.
- Check that you have appropriate detector chosen (SE detector is recommended in the beginning).
- Go to minimum magnification.
- Use the Auto Brightness/Contrast function.
- Check that the electron emission is not zero (see the Electron beam panel) – in such a case call the guarantee immediately.

#### No FIB Image

- Check that (ion) Emission is ON.
- Check the ion beam current.
- Set the minimum magnification and Auto Brightness/Contrast function.
- Set the Rough milling preset and check the ion beam current. Current should be around 10 nA, if current is significantly lower check the value of extractor voltage in FIB monitor panel. In case the extractor voltage is close to 9 kV contact guarantee.

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#### RBSE Detector

- Don't move with RBSE detector to working position if the WD&Z (after focusing) is smaller than 9 mm. In Chamber view check the mutual position of the end of the detector and the stage with the samples during the detector movement. Hit the Stop button (Motorized RBSE panel) immediately when it seems there might be a collision!
- When finished, put the RBSE to home position.

#### Plasma Cleaner

- In case you would like to clean chamber using plasma cleaner make sure that EDS is in the parking position. Using plasma cleaner when EDS is inserted may cause fatal damage to detector!
- Move with the SEM stage to Home position before start of the cleaning.
- Consider if you can leave your samples on the stage during the cleaning.

#### EDS detector

- Move EDS detector to working position carefully not to displace the fixation segment. In Chamber view check the mutual position of the end of the detector and the stage with the samples during the detector movement!
- When finished, put the EDS to standby mode (within Esprit software) and close Esprit software.

#### GIS

- Check the position of the stage (WD&Z, tilt) – WD ~9mm, 55° for FIBID, WD ~9.5 mm (sample has to be flat!), 0° for FEBID; then move with GIS nozzles to working position. Watch Chamber View when GIS nozzles are moving. Hit the Stop (GIS Microstage Adjustment panel) button immediately when it seems there might be a collision!
- Don't start GIS calibration procedure if the stage is close to SEM objective (move with the stage to Home position first).
- Before first opening of the gas valve, put the electron beam off (BEAM ON button should be gray) and ion emission off (Emission button should be gray). Watch chamber pressure indicator bar and in case there is strong pressure increase (red color), wait for pumping down to green area. Then close GIS valve and open it again. If the pressure is in red area yet again, do the outgas procedure. Rapid chamber pressure increase can switch off the electron emission and there is a strong risk for cathode damage!
- In case you not see any deposition/enhanced etching check your project parameters and position of GIS nozzles. The deposition will not start if the chamber is pumped for a short time (wait minimally 30 minutes for suitable chamber pressure).

#### Nanomanipulators

- Check adjusted working position of left/right nanomanipulator and the quality of the needle tip(s) before the usage. See EBIC manual or help for needle exchange and manipulation with the nanomanipulator(s).

#### EBL

- In case you are exposing/depositing just squares instead of your pattern check in the Beam Blanker panel that Electromagnetic blanker is on (GUN button is blue and "blank after scanning stops" is ticked – if not call the guarantee) and that Electrostatic blanker control is put to "Enable beam on acquisition".

#### EBIC

- Your sample should be isolated from stage. See EBIC manual or help.

#### Notes

- Close the SEM/EDS control SW and restart SEM/EDS computer if a function in the SEM/EDS SW does not work properly. Check if a problem still occurs after the restart. If the problem is still there or if there is another serious problem, always contact the guarantee. Send the mail about it to other experienced users and make a note to the instrument book.