ZEISS SUPRA 55VP SEM SOP

Zeiss Supra 55VP is for imaging dry solid samples from micro to nanoscale in a high vacuum environment.

Sample requirements: Make sure your sample is dry and conductive. Do not put outgassing materials inside high vacuum. Do not put unbaked resists inside chamber.

Typical conditions for imaging:

➢ Keep record of system vacuum and gun vacuum before beginning to load sample (Figure 2). For better imaging, gun and system should have high vacuum.

Sample preparation and pre-loading

➢ Prepare the sample on carousel (Figure 2)
➢ Spray your sample with Nitrogen gun prior to loading sample in load luck
➢ Dry sample using IR lamp
➢ Sign into the computer using local account (Figure 3):
  Username: SEM1-user
  Password: Supra55VPgoodmachine!!!
➢ Sign into EM server
  Username: SEMuser
  Password: SEMuser01
➢ ZEISS smart SEM user interface window appears (Figure 4)

➢ Check vacuum and vacuum status from the interface as shown in Figure 5
➢ Go to the **Stage** and then **Navigation (Figure 6)**. Stage navigation window appears as shown in **Figure 7**.
➢ Go to Stage → Stage initialization (Figure 8) and observe the change in stage navigation window (Figure 9).
Loading sample in load lock

➢ Press **purge** button and wait until door can be opened (right panel Figure 10)

![Image](image1.png)

![Image](image2.png)

**Figure 10**

➢ Insert the sample holder into load-lock chamber
➢ Close door carefully and **deselect purge**
➢ Press **pump** button
➢ Push **load** button on SEM control panel and wait for the proceed light to become green (Figure 11)
➢ Push **open** button to open **gate valve** (door)
➢ Insert rod onto stage
➢ Extract the rod
➢ **Deselect the open** button to close the door
➢ When the gate close light is on, deselect **pump** and push **purge** for 1 second and deselect **purge**

![Image](image3.png)

**Figure 11**
Preparation for imaging

Wait for the vacuum level to reach about \((3-5) \times 10^{-6}\) mbar before turning on high voltage

- **Initialize stage** again (Figure 8)
- **Selection of EHT** value is suggested from 5-10 keV for learning purpose. To select EHT value, go to **Gun** (Figure 12) and then insert desired value of **EHT target**. After that, apply accelerating voltage using **EHT On**
- **Select Detector** → **SE2** (Figure 13)
- **Aperture**: Use 30-µm (Figure 14)
- Obtain image from metal stage and the edge of hole at large working distance (about 15-20 mm)
- Adjust the **focus, brightness and contrast** in order to get an image at higher working distance
- After obtaining an image at higher working distance, decrease working distance to around 7 to 10 mm
- Align **Aperture** using **Wobble** and correct astigmatism using **Stigmator**
- Increase **Magnification** and correct focus and astigmatism
➢ During SEM observation and saving image, use **Scanning speed 2-3 (Figure 15)**
Taking Picture and Saving image

➢ Get picture using **Line Integration**

➢ **Change directory**

➢ Insert **File name**. Save image into **Data (G:) drive** and go to **Image and save in your folder (Figure 17)**
Unload sample

- Turn off EHT and Switch to TV view
- Initialize stage
- Push unload (Figure 19)
- Push pump button on load lock
- Push open button to open gate and wait for light to be proceed
- Insert rod
- Extract rod
- Push purge button and open load lock
- Take out sample and close door gently and push pump for a while and deselect pump
- Remove sample and store sample in storage box and clean the preparation area
- Check vacuum of gun and system before you leave the session. Close the EM server and sign out.
- Make sure you have entered your sample information and any error message you encountered in log book.

In case you encounter any error, report error using following

- Take Screen shot of an error message
- Save screen shot into Supra 55VP_Issues folder in Data (G:) drive (Figure 19)
- Write in log book

Figure 18

Figure 19