

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**

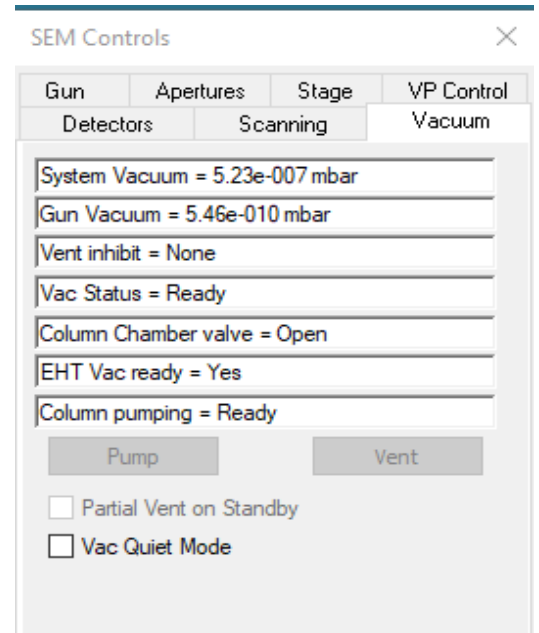


Figure 1

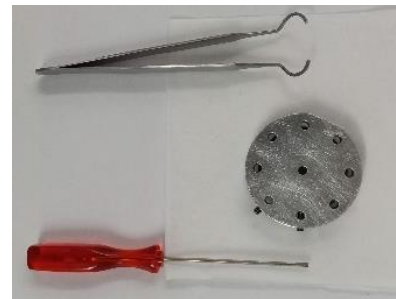


Figure 2

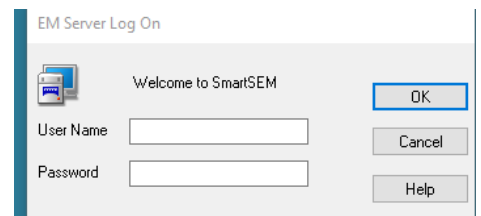
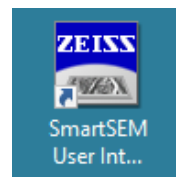


Figure 3

➤ Go to the **Stage** and then **Navigation (Figure 6)**. Stage navigation window

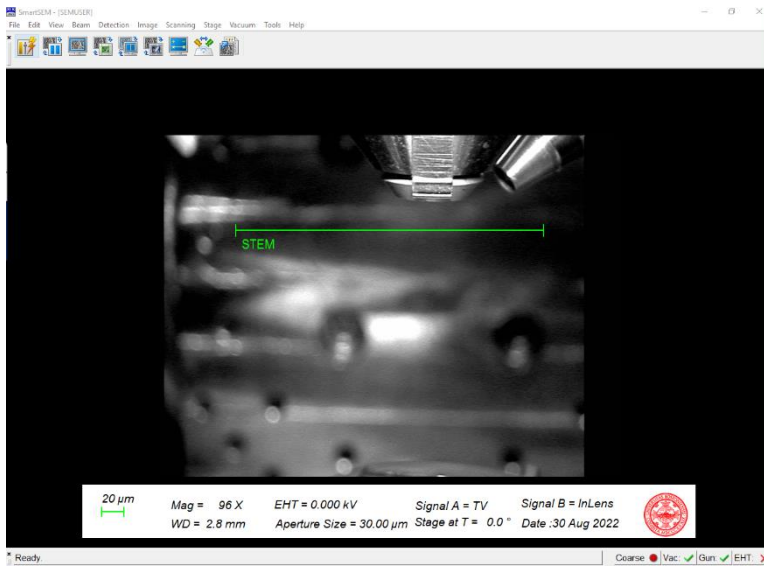


Figure 4

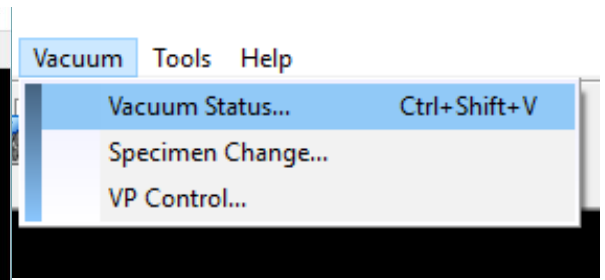


Figure 5

appears as shown in **Figure 7**.

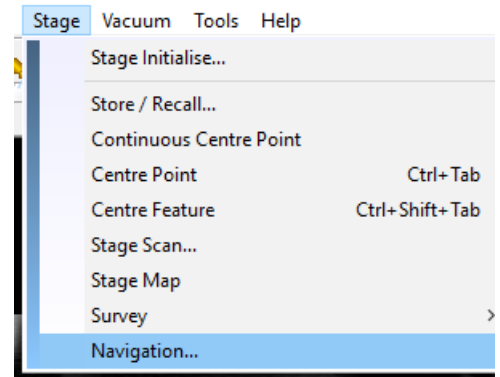


Figure 6

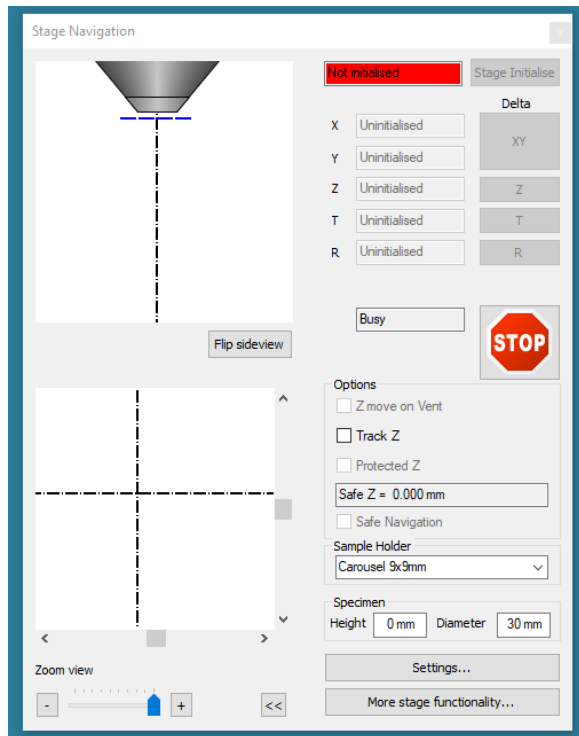


Figure 7

- Go to **Stage** → **Stage initialization (Figure 8)** and observe the change in stage navigation window (**Figure 9**).

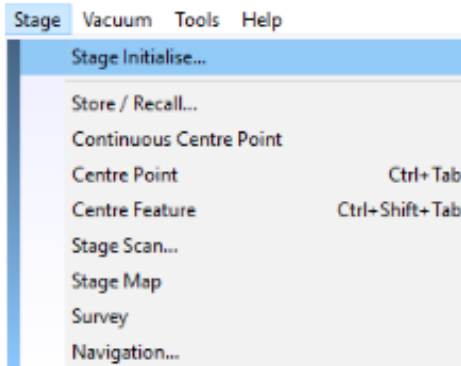


Figure 8

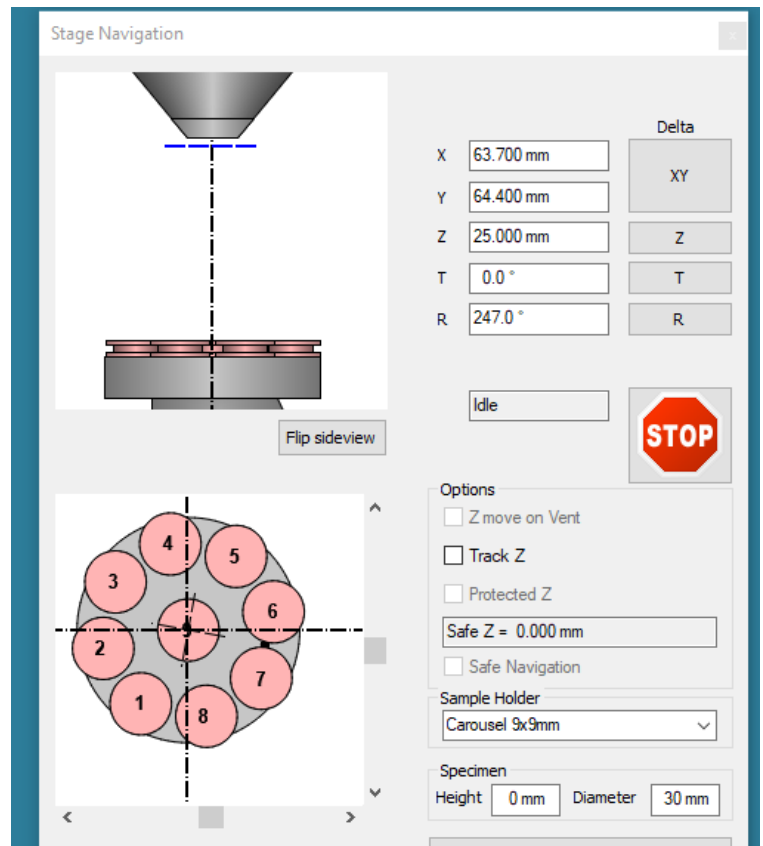


Figure 9

Loading sample in load lock

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



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**

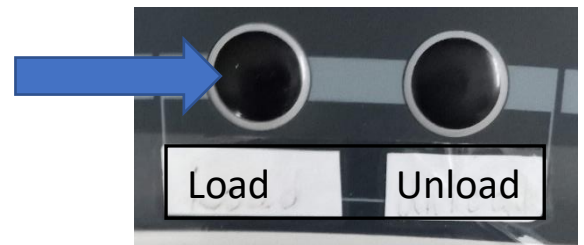


Figure 11

Preparation for imaging

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

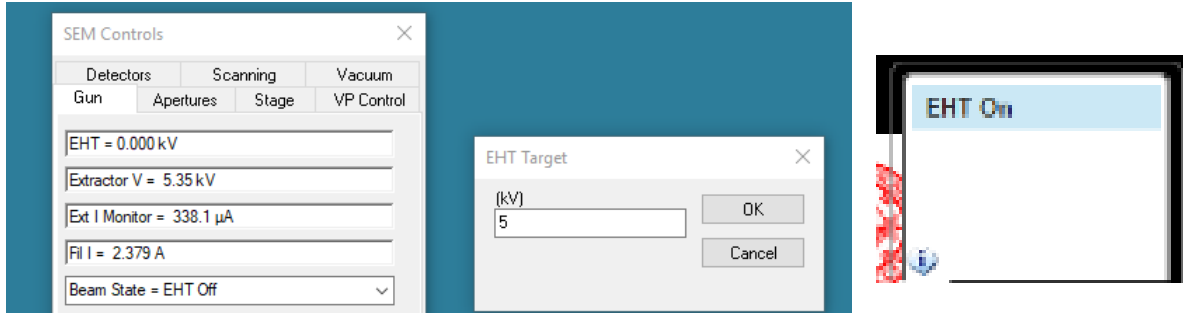


Figure 12

- 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

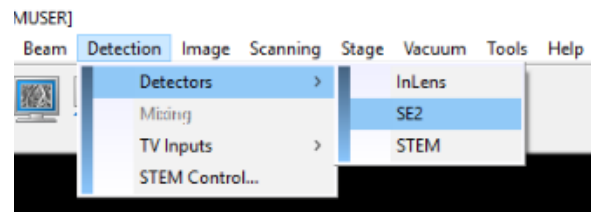


Figure 13

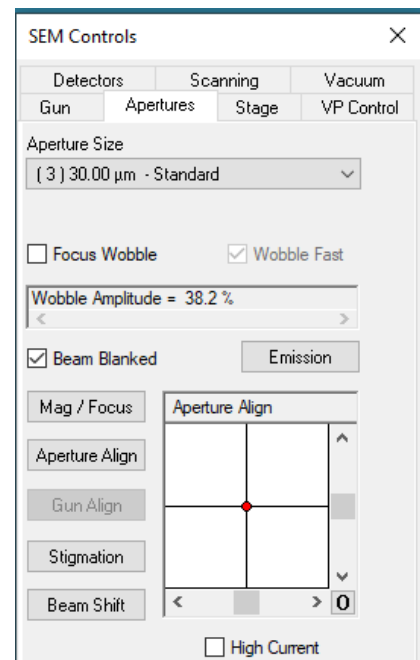


Figure 14

- During SEM observation and saving image, use **Scanning speed 2-3** (Figure 15)

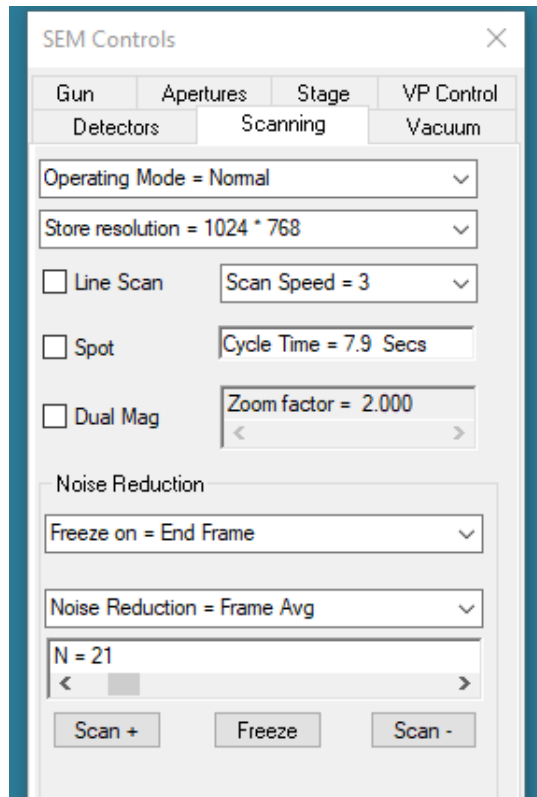


Figure 15

Taking Picture and Saving image

- Get picture using **Line Integration**

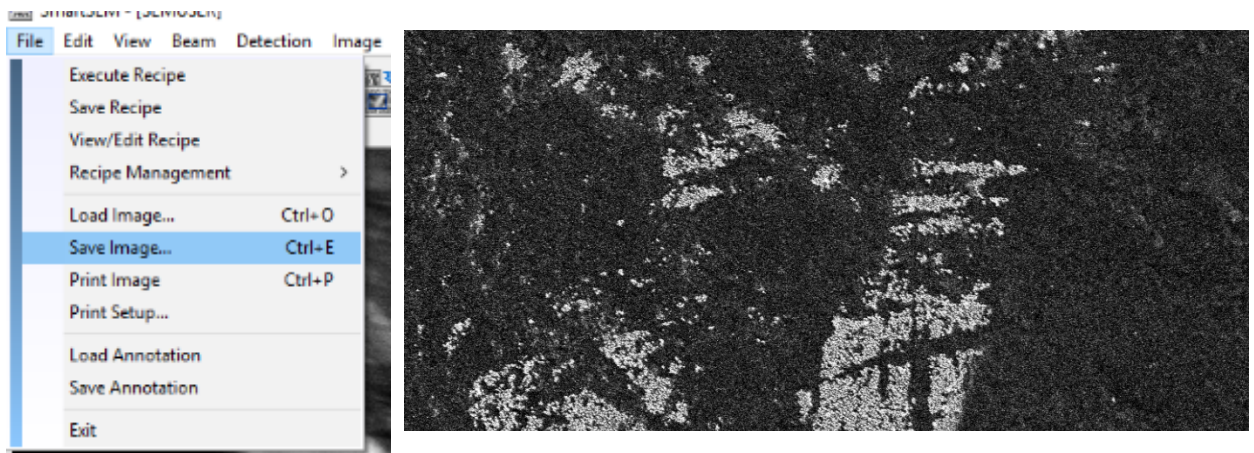


Figure 16

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

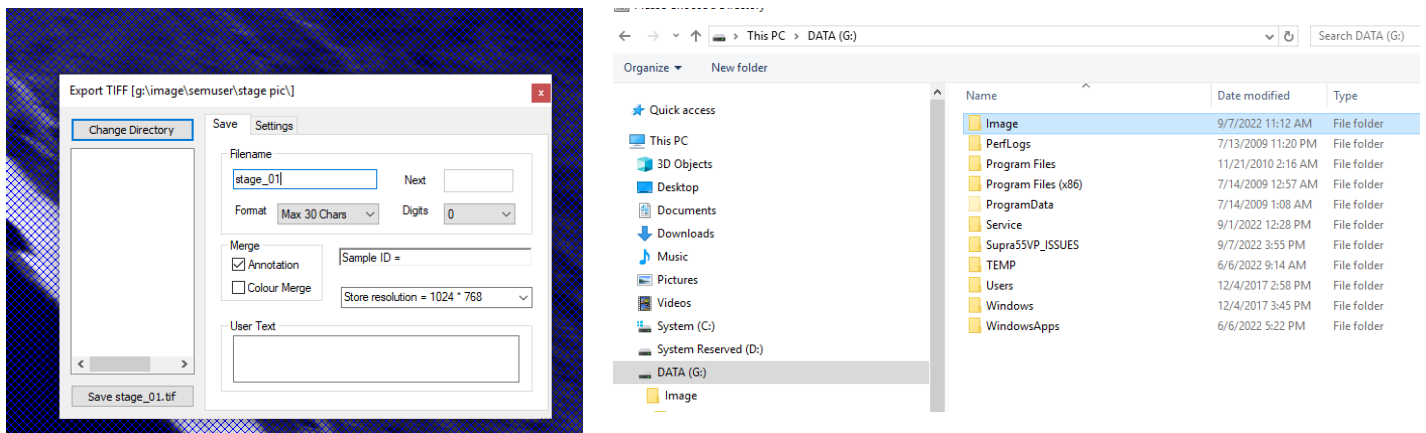


Figure 17

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.



Figure 18

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**

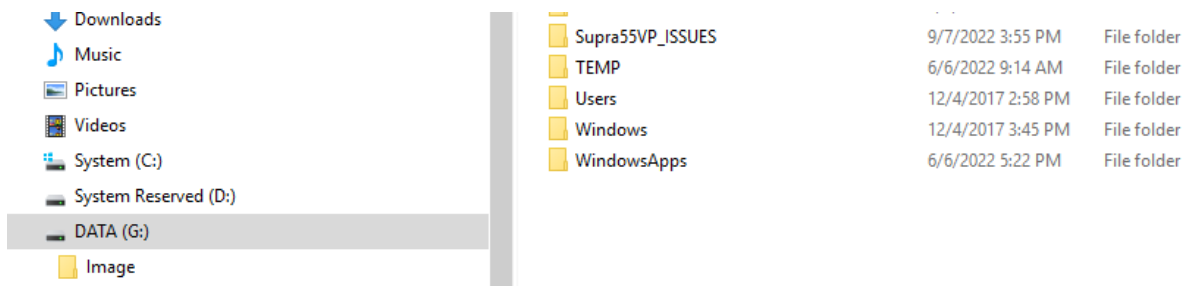


Figure 19