# **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

SEM Cont	rols		×		
Gun	Apertures	Stage	VP Control		
Detecto	ors Sca	anning	Vacuum		
System Vacuum = 5.23e-007 mbar					
Gun vacu	um = 5.46e-01	U mbar			
Vent inhib	it = None				
Vac Statu	s = Ready				
Column Chamber valve = Open					
EHT Vac ready = Yes					
Column pumping = Ready					
Pu	mp		Vent		
Partial Vent on Standby					
Vac Quiet Mode					





Figure 2

	EM Server Log On			
		Welcome to SmartSEM	OK	
SmartSEM	User Name		Cancel	
User Int	Password		Help	

Figure 3



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

Figure 7

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



Figure 9

## Loading sample in load lock

Press purge button and wait until door can be opened (right panel 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) ×10<sup>-6</sup> mbar before turning on high voltage

SEM Controls		$\times$
Detectors Gun Ape	Scanning rtures Stage	Vacuum VP Control
EHT = 0.000 kV Extractor V = 5.3 Ext I Monitor = 3 Fil I = 2.379 A Beam State = EH	15 kV 38.1 µА IT Off	~



MUSER1

- 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  $\rightarrow$  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

Detectors

TV Inputs

STEM Control...

Mixing

Beam Detection Image Scanning Stage Vacuum Tools Help

InLens

SE2

STEM



Figure 14

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

SEM Cont	rols			$\times$	
Gun	Apert	tures	Stage	VP Control	
Detecto	Detectors		anning	Vacuum	
Operating Mode = Normal ~					
Store resolution = 1024 * 768 V					
Line Sc	an	Scan	Speed =	3 ~	
Spot		Cycle	Time = 7.	9 Secs	
🗌 Dual Mag		Zoon <	Zoom factor = 2.000 < >		
Noise Reduction					
Freeze on = End Frame					
Noise Reduction = Frame Avg ~					
N = 21 <				>	
Scan +		Free	eze	Scan -	

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.

#### 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

Downloads			
	Supra55VP_ISSUES	9/7/2022 3:55 PM	File folder
J Music	TEMP	6/6/2022 9:14 AM	File folder
Pictures	Users	12/4/2017 2:58 PM	File folder
Videos	Windows	12/4/2017 3:45 PM	File folder
System (C:)		6/6/2022 5:22 PM	File folder
System Reserved (D:)			
DATA (G:)			
🔒 Image			



