

# SNE-4500M Plus

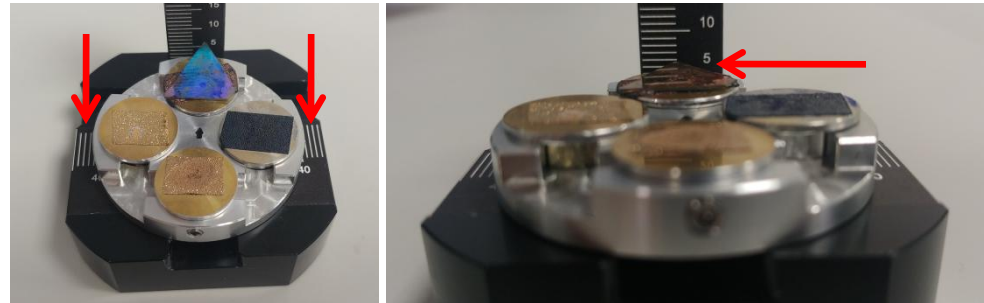
The Best Tabletop-SEM



**Tabletop-SEM Quick Manual**  
**SNE-4500M Plus**

EN

# Quick Manual (1) – Preparing Samples (Height Adjustment)



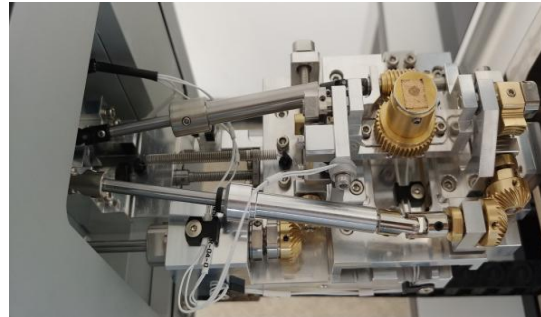
## 1. Preparing a Sample

Measure the width and height of the stage.


E.g., In the above photos, width and height are 40 mm (1.575 in) and 6 mm (0.236 in) respectively.

## 2. Fixing the Specimen

Method: Fixed by Screw (Size of the wrench: 1.5 mm (0.059 in))



## 3. Inputting the Measured Values


Input the values for Width and Height column properly and push the **Camera** button (  ) at the side to take navigation images.

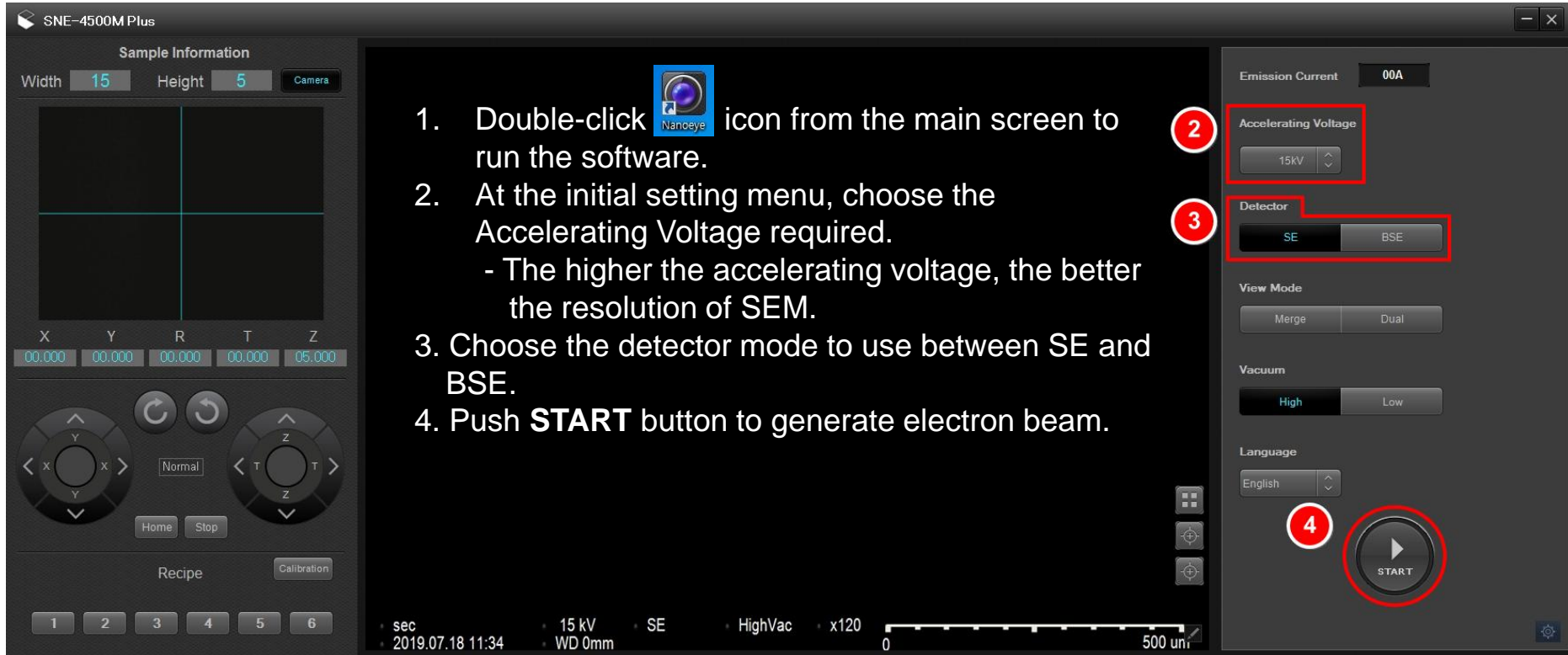
※ **Caution:** When EDS is set up, **5 mm (0.591 in)** must be added for Height.




# Quick Manual (2) – Preparation, Start, and Finish of the Equipment



1. Turn on the power switch (POWER).
  2. Open the door and change/fix the sample. (Refer to Quick Manual (1))
  3. Take navigation images of the sample. (Refer to Quick Manual (1))
  4. Push the door slowly to close.
  5. Push EXCHANGE button to make the chamber vacuous (It takes three minutes).
    - Push and pull the door a little to check if the chamber is sufficiently vacuous.
    - Once the vacuum is accomplished, an alarm beeps.
- ※ Continuous alarm means that the chamber is not vacuous enough. Push the door and push EXCHANGE button one more time, then check if the chamber has become vacuous.  
(If the problem continues, please call the service center.)
6. Double-click  icon from the main screen of PC to start the program and get images from the first work to the last. (Refer to Quick Manual (3))
  7. Once the images are completely analyzed, click the Operation Mode to activate and click STOP button to cut (finish) the pressure.
  8. Push EXCHANGE button to release the chamber from vacuum  
(It will be done within 90 seconds).

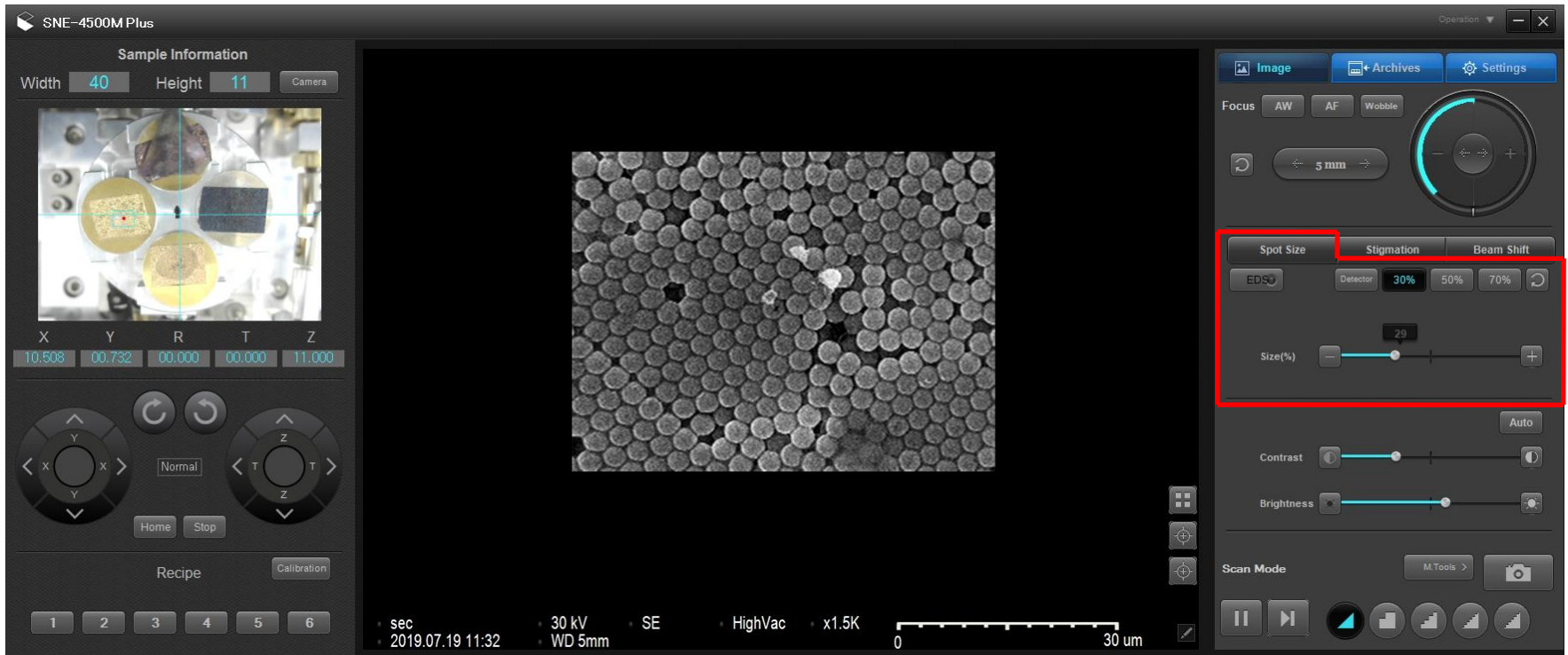


1. Double-click  icon from the main screen to run the software.
2. At the initial setting menu, choose the Accelerating Voltage required.
  - The higher the accelerating voltage, the better the resolution of SEM.
3. Choose the detector mode to use between SE and BSE.
4. Push **START** button to generate electron beam.

1. **The Software may not run**, if the power of SEM is off or if the SEM-PC cable is not properly connected.
2. **High Vacuum mode is set to normal** for 4500M model, but **Low Vacuum mode is also selectable (optional)** for observational purposes.
3. Check the Beam current value at the upper right if it remains in between 100-120 uA. In case the filament is broken, it drops below 60 uA and **the image is disappeared**.



Operation  
Emission Current 110uA



1. As shown above, the initial image is shown in **a small window (Live Mode)**.

If the image looks dark, adjust the **“Spot Size.”**

(The lower the percentage goes, the more electrons get to the surface of the sample. The brightness must not be too dark nor too bright. The range for appropriate spot size is in between **10 to 30 %**.)

※ **In case image is invisible completely,**

1) Check for the filament value (At the upper right, click **‘Operation’** button to check if the filament is broken (Beam Current).)

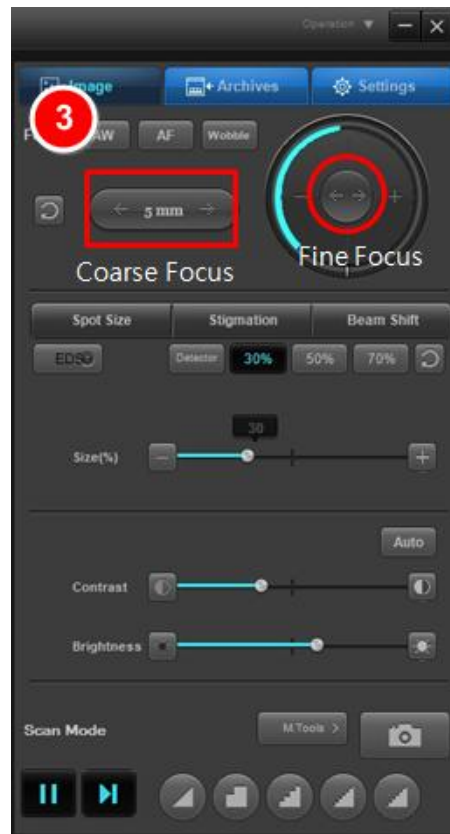


2) From the right side of SEM equipment, adjust Variable Aperture Alignment.

- Between the X and Y axes, adjust the Y-axis dial to clockwise or counter-clockwise to check the position for Beam Center (Refer to Quick Manual (9)).



1. On Navigation window, **click and move a spot** to look at (The red dot shows the position you are looking at).
2. Once you select the inspection location, **roll the mouse wheel to adjust the magnification**.
  - Roll the wheel 'up': Increase magnification, Roll the wheel 'down': Decrease magnification

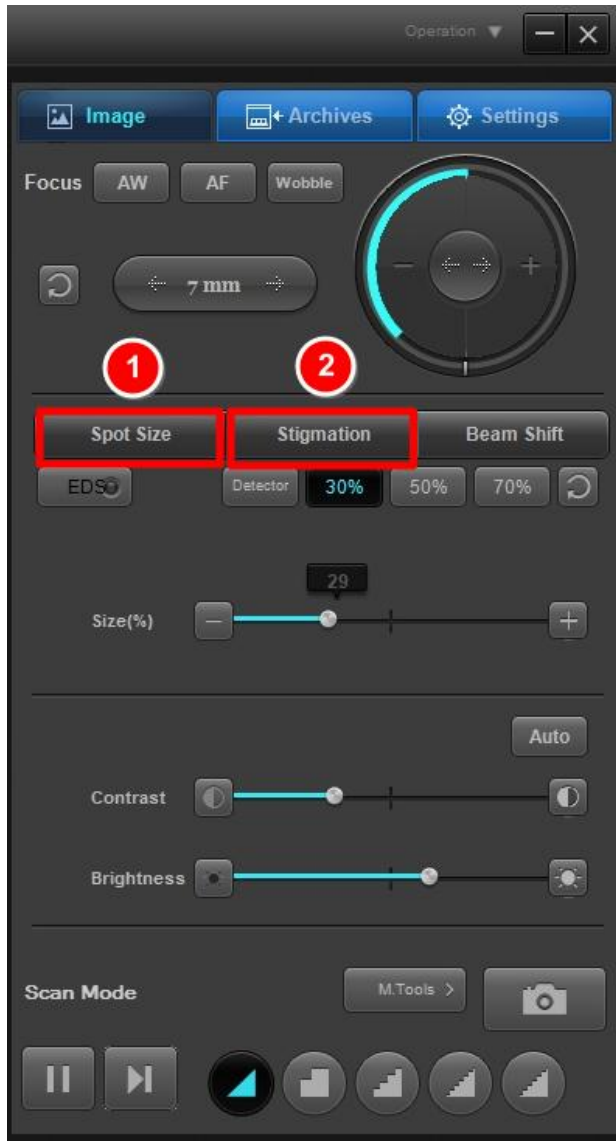


3. At the '**Focus**' area, click the mouse button to adjust focus.
  - Focus adjustment should be done at a magnification which is higher than what you want to look at.

## ◆ How to adjust focus

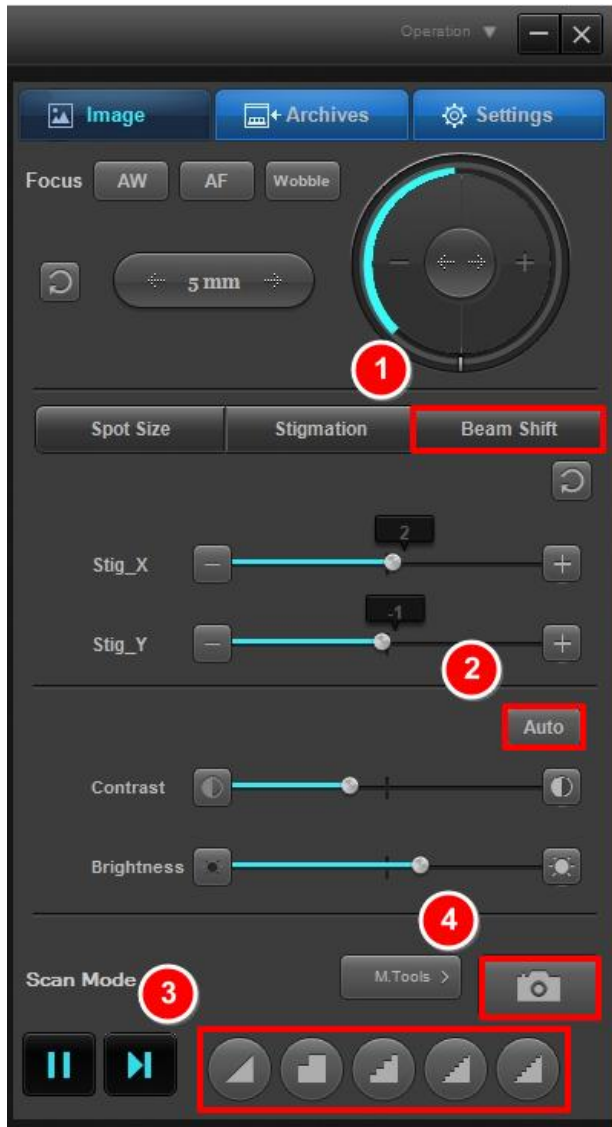
- 1) **Coarse Focus:** Used to adjust focus on a large area. Click the mouse button once and move the mouse to right or left, then release it by clicking it one more time where the image looks the most clear. (Normally, the right value is the same with the height of the specimen.)
- 2) **Fine Focus:** Used to adjust focus with more precision and follows the same process as Coarse Focus.

# Quick Manual (6) – Spot Size Adjustment and Stigmation Adjustment



1. Resolution and **brightness of the image is controlled** by adjusting the 'Spot Size' using **Spot Size Mode**.
  - (1) 10-30%: It can get brighter images, but focus adjustment is limited at high magnification (The edges of the image are not clear).
  - (2) 30-50%: It can get image with the most proper brightness and magnification (When magnified 10,000-30,000 times)
  - (3) 50-90%: It can give the highest resolution (around 50,000 times) But the image looks dark.
    - ◆ The actual result at **Spot Size Mode** can vary, according to the sample and equipment condition. The **Spot Size** should be adjusted properly for each inspection condition.
  
2. **Stigmation Mode** is the function for 'astigmatism correction.' It narrows down the beam size by moving X and Y axes and makes the **Edge** clearer.
  - (1) Not for image analysis of a magnification under 3,000 times.
  - (2) In case the image is still not clear after focus adjustment, move the X and Y axes to the right or left significantly to find a spot where the image looks the most clear.


# Quick Manual (7) – Beam Shift, Contrast and Brightness, Saving Images



- 1. Beam Shift function** is used to move the X-axis (horizontally) and the Y-axis (vertically) very slightly.

  - Stage(X, Y): Beam is fixed, position is moved by using stage (40 mm/ 1.575 in)
  - Beam(X, Y): Stage is fixed, position is moved by adjusting beam (100 um)
- 2. Contrast and Brightness** are color functions for SEM images. Moving right means the image becomes brighter and moving left means it becomes darker.

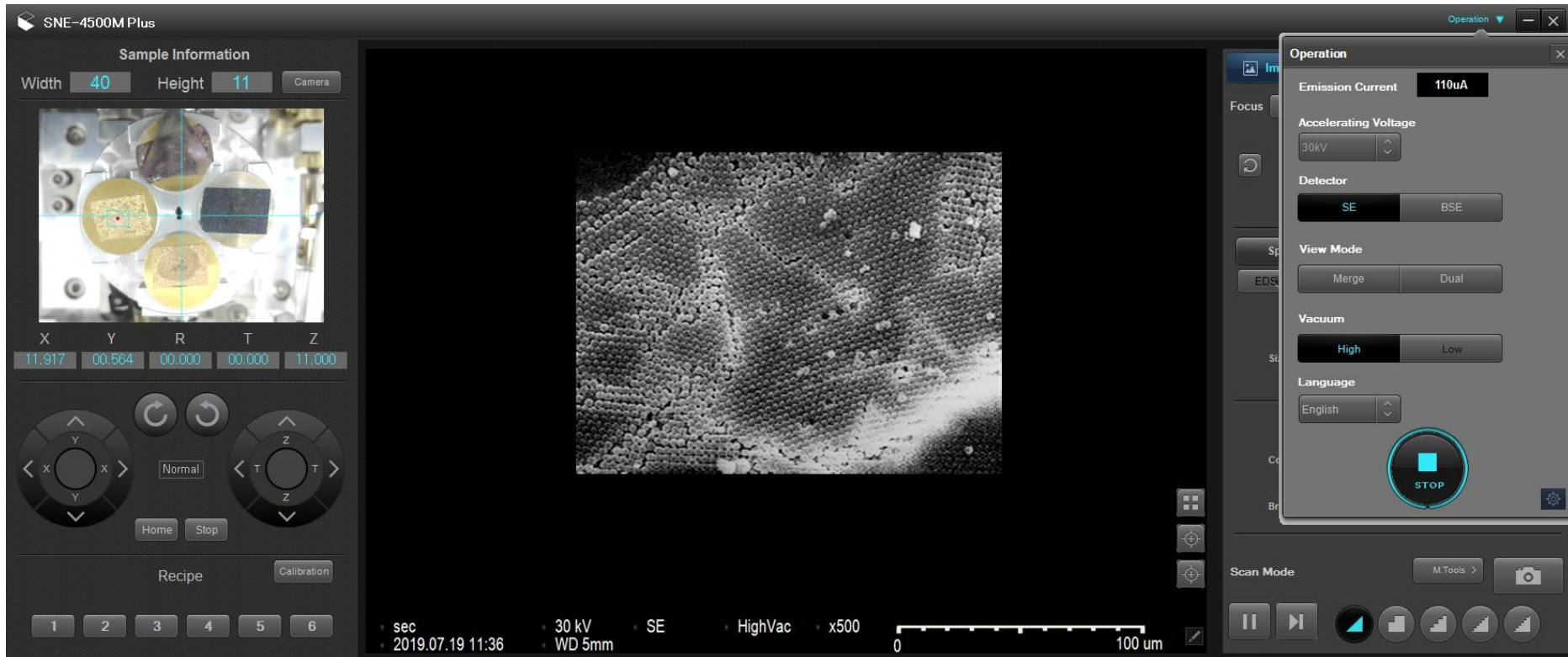
  - To revise quickly these values of an image medium, use the **Auto** button frequently.
- 3. The Scan Mode** has five modes.

  - 1) **Fast Scan** (Capture Live 320 x 240: 0 second) = focus adjustment and relocation
  - 2) **Slow Scan** (Capture entire image 640 x 480: 3 seconds) = modifying the image and confirming it before saving
  - 3) **Fast Photo 1** (Saving the image 1280 x 960: 30 seconds) = saving it at low resolution
  - 4) **Slow Photo 1** (Saving the image 2560 x 1920: 60 seconds) = saving it at high resolution
  - 5) **Slow Photo 2** (Saving the image 5120 x 3840: 120 seconds) = saving it at highest resolution
- 4. To save an image**, click a mode from **Scan Mode** and click the **Camera** button (  ).

  - File saving method 1: click the Scan Mode and click the **Camera** button.
  - File saving method 2: click the pause button and click the **Camera** button.

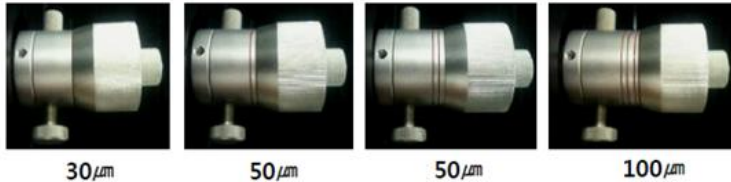


# Quick Manual (8) – Finishing Image Analysis (Stopping the Equipment)



1. To finish image analysis, click the **Operation** button at the top of SEM Software. After the image condition window is enabled as shown above, click the **STOP** button to quit (To turn off the electron beam).
  - To realize a new image by changing the accelerating voltage during image analysis, **click STOP button to cut electron beam**, set a new accelerating voltage, then click START button.
  - ※ When removing and changing the sample, click **STOP** button, then press **EXCHANGE** button from SEM equipment to release the vacuum.

## Configuration of Variable Aperture (four levels)

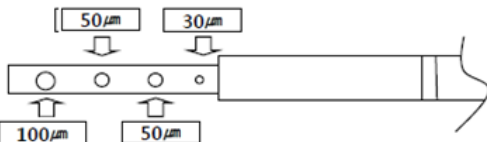


30 μm

50 μm

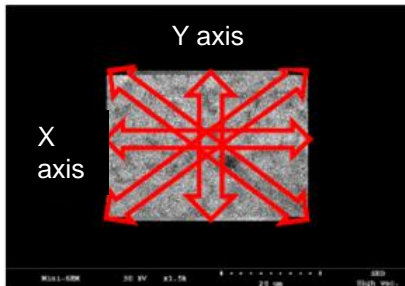
50 μm

100 μm

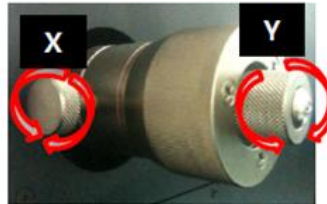


The smaller the aperture hole size is, the better the resolution becomes.

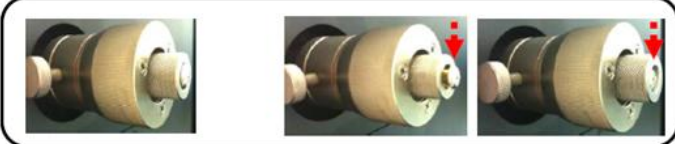
- 30 or 50 um recommended.




Correct position for X and Y axis knobs



Incorrect use of X and Y axis knobs



- 1) If the image moves or changes at live mode window during focus adjustment, **right-click** over Wobble (  ) of the program to activate it.



- “W” Bar setting range: click the “▶” button for **F (Max)**, **A (1-5 times)**.

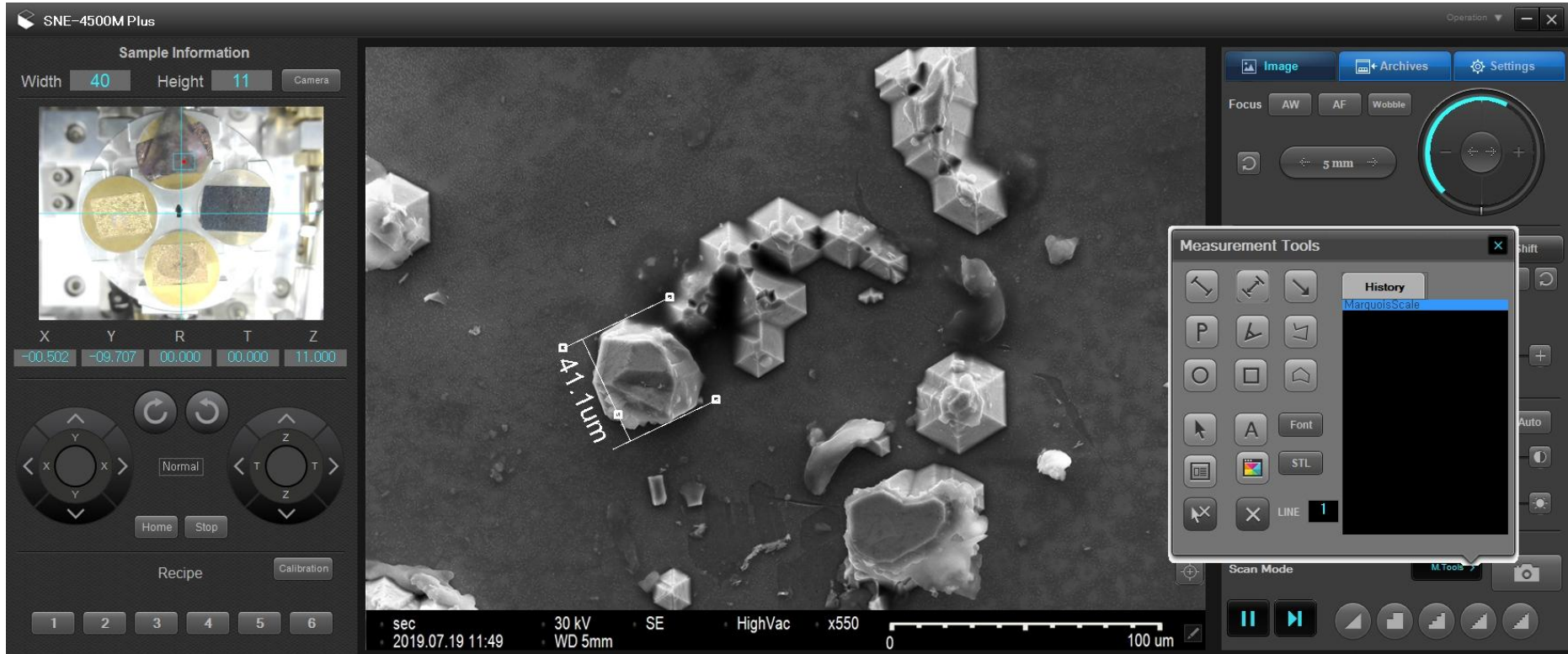
- F (Freq.): changes the frequency speed wobbling the image.
- A (Ampl.): amplification wobbling the image, changes the wobbling range

- 2) The image moves horizontally and vertically in the SEM S/W live window. Adjust or rotate the axis knob with more wobble to find the position at which the wobble decreases. Start the adjustment from the direction with higher wobble.

- It is best to treat the wobbles within around 1,000 times first and then to treat finer wobbles within around 10,000 times.
- When wobbles in a live image is lower under higher magnification, the image can be realized better.

- 3) Once the wobbling is minimized for an image, **left-click** over W (wobble) to stop the wobbles (Stops the beam from wobbling).

- If the variables are set to some degree, the gap between the Y axis knob and the outline around aperture adjustment knob is even and the bottom side of the bolt for the Y axis knob aligns with the bottom side of the Y axis knob handle.



1. Using **Measuring feature**, length, angle, area, diameter and text can be shown at the screen and the image can be saved with these values labeled on it.
  - Click the Scan Mode. Once the scan is done as indicated by the Data indication bar at the bottom of the window, click the pause button and use the tools as shown above.



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