



# Student Operating Instructions for the Hitachi S-3400 SEM

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### 1. Precheck & Prep:

1.1 Check Log sheet to see if last user has signed out and whether there is anything abnormal mentioned in the comments.

1.2 **Prechecks:** Evac power on. Power switch should be on "ON", NIR displayer (to monitor the chamber) should be turned on. Open the PC-SEM program (no password required for authorized users)

1.3 **Sample assembly.** Coat a conductive layer onto the sample as needed. Fix specimen mounts onto the base stand. Measuring of the sample height with the Height Gauge. The height gauge indicates the height of the sample when the sample stub and base stand are combined (without the sample holder).

### 2. SEM Operation:

#### 2.1 Sample loading

2.1.1 Make sure the sample stage is at **Z65** home position (upper right corner, the blue marker before the Home Z65)

2.1.2 Make sure the High voltage is off (upper left corner, the blue marker before the OFF button,  $I_e = 0$ )

**Be sure to measure off the sample height, set the sample size and height on the stage control menu before loading the specimen to the stage. If they are not properly set, the sample can touch the BSE detector, potentially causing damage to the detector.**

2.1.3 Vent the chamber by depressing the 'AIR' button on the low right hand side of the column unit. Wait until the \*\*\*\*\* on the lower left corner disappear completely. Slide open the chamber and slide in the specimen holder (with the sample mount and base inserted) onto the sample stage.

2.1.4 Close the chamber, Press the 'EVAC' button on the column unit. Set the sample width and height.

2.1.5 Wait until the vacuum is ready. (The ON button at upper-left corner is activated and turns black; it could take up to several minutes)

## **2.2 Gun saturation**

2.2.1 Setup the high voltage from setup menu optics tab, and the probe current at 50 under the same tab and click on.

2.2.2 Saturate the filament by clicking on the AFS button with “mid” selected.

2.2.3 Adjust the gun bias by clicking ABS(optional).

## **2.3 Find an image**

2.3.1 Adjust the image magnification counterclockwise. Click ABCC to auto adjust brightness and contrast. Use the Trackball to move the sample to the area of interest.

2.3.2 Set the working distance by going to the stage tab and click on Analysis, or input a Z value and click go.

2.3.3 Sharpen image using the Focus and stigmators.

## **2.4 Alignment**

Set the magnification to the highest magnification expected to be needed and bring a recognizable spot to the center of the screen. Perform focus and stigmatation corrections to sharpen the image as much as possible.

2.4.1 Click on the align button at the top of the screen, use the stigmator knobs to stable the image.

2.4.2 Click the beam align tilt, then click auto.

2.4.2 Click the beam align shift, then click auto.

2.4.3 Click on the stigma X, adjust the X, Y knobs on the control panel to stop the image shift in any direction.

2.4.4 Click on the stigma Y, adjust the X, Y knobs on the control panel to stop the image shift in any direction.

2.4.5 Click on “off” to stop the alignment procedure.

## **2.5 Sharpen the image**

2.5.1 Shorten the working distance by changing the Z value (don't make it smaller than 5 mm! Watch the sample holder as it moves upward toward the pole piece, in case of emergency, click “stop” on the upper right corner of the screen to stop collision)

2.5.2 Focus first as good as you can, then adjust the stigmator x to the best, then the stigmator y. Each time just adjust one knob. Don't try adjusting two together, you will get lost.

2.5.3 Other options, such as switching to a smaller objective aperture, or changing to a different acc voltage. In these cases, repeat the alignment and focusing procedures.

**2.6 Save images** Freeze and save. Click on the image capture button on the top of the screen to acquire an image. Pre-settings can be changed by right-clicking the mouse. As

you taking images, all will show on the captured images panel. Direct them to PCI software by clicking the PCI button on the top of the screen and save them through PCI into your own folder under D drive.

## 2.7 Shutting off

Click “HOME Z65” to reset the sample holder position.

Click “off” on the setup HV panel

Press “AIR” button to vent the chamber. Take your sample out. EVAC the chamber.

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