

## Characterization Microscope – Nikon LV150

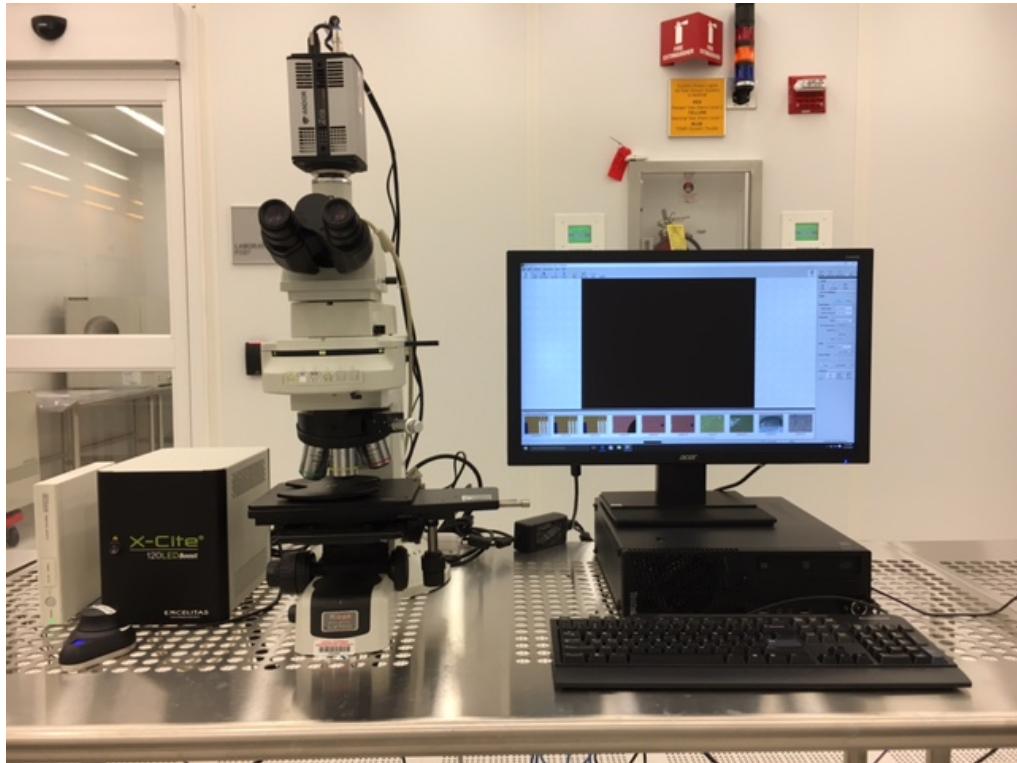


Figure 1: Microscope – Nikon LV150

### Introduction

This upright optical microscope is designed for investigating up to 150 mm (6 inch) semiconductor wafers but can also be used for fragments and many other types of samples. It can capture colored images and record high-speed videos.

### Feature and specifications

- 1) High-intensity white-light LED source
- 2) Upright reflected light microscope
- 3) Bright field, dark field, DIC, polarization, and fluorescence modes
- 4) Objectives: 5X, 10X, 20X, 50X, and 100X
- 5) 5 mega pixel color camera for image acquisition
- 6) Andor Zyla 4.2 sCMOS high-speed video camera

### Precautions

- 1) Do not crash the lens. Focus at 5X by lowering the stage and then go to higher magnification objectives one step at a time while adjusting the fine focus.
- 2) Dry samples only.

### Operating procedure

- 1) Log in the equipment in FOM.
- 2) Switch on the microscope light (Figure 2).

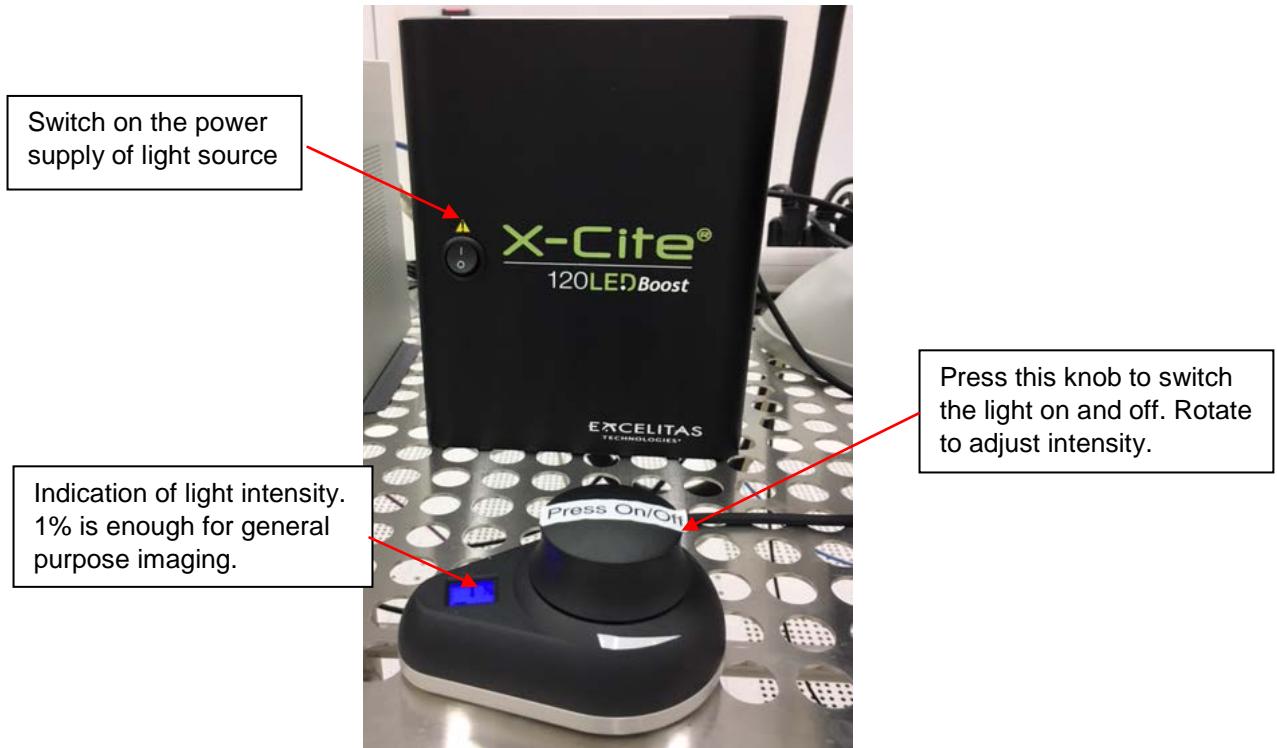


Figure 2: Light intensity control

3) Adjust the filters (Figure 3, 4, and 5).

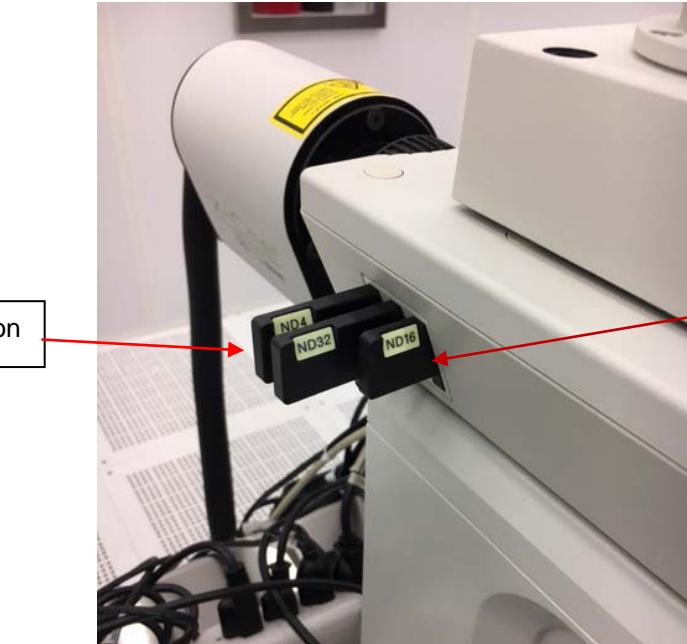


Figure 3: Neutral Density Filters

Field diaphragm lever.

Suggested position: inserted and high

Aperture diaphragm lever.

Suggested position: inserted and high

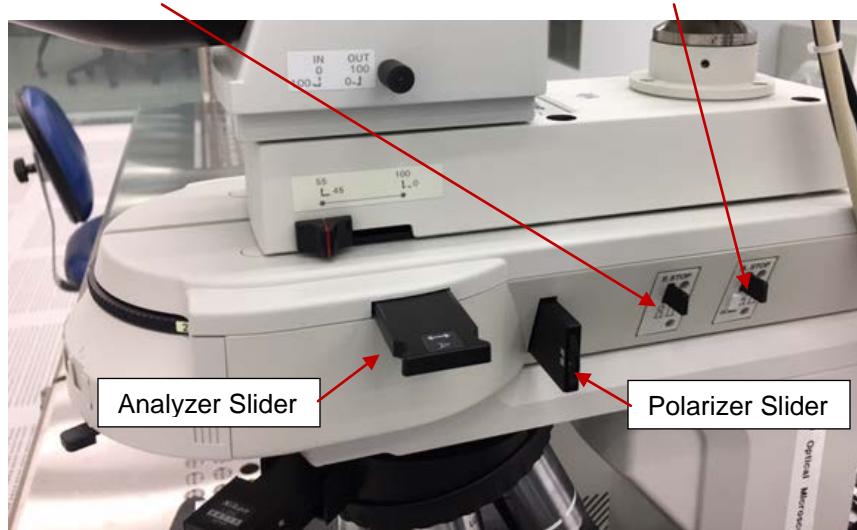


Figure 4: Field and aperture adjustment

Rotate to choose a filter:

1. Brightfield with UV cut  
(suggested for general imaging)

2. Dark field

3. Blue light.

Wavelength 450 – 490 nm.

4. Green light.

Wavelength 510-560 nm.

5 and 6 not used.

Shutter  
Suggested Position: O

DIC slider

Do not change

Prism movement

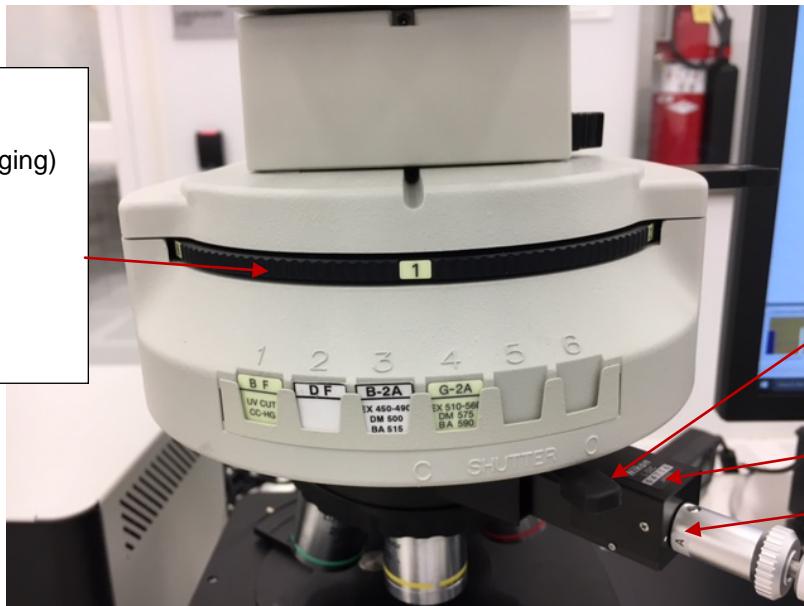


Figure 5: Illumination filters, shutter and DIC (differential interference contrast) slider.

- 4) Load your sample after moving the stage out with the course lever on the right (Figure 6). Choose 5X objective. Make sure there is enough clearance between the sample and the objective before moving the stage in. Move sample under the objective lens using fine stage movement (Figure 6). Select brightfield mode '1'. While looking from the front, raise the stage (using focus knob on the left bottom, Figure 6) to bring sample within about 1 cm of the objective (beyond focus point). **Do not crash into the objective.** Now focus by looking in to eye-piece and lowering the stage slowly. Adjust light and filters as

needed (Figure 6 and 7). For higher magnifications, turn the turret one step at a time and fine focus. Always turn the turret by rotating it, **never by pushing on objectives**.

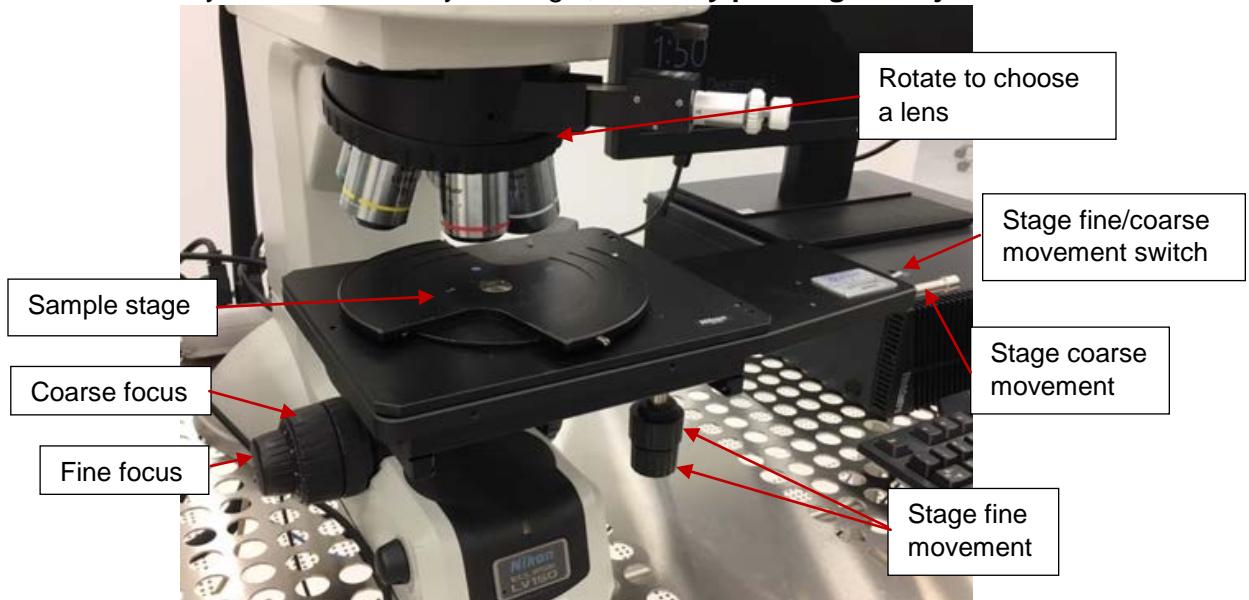


Figure 6. Focus on samples.

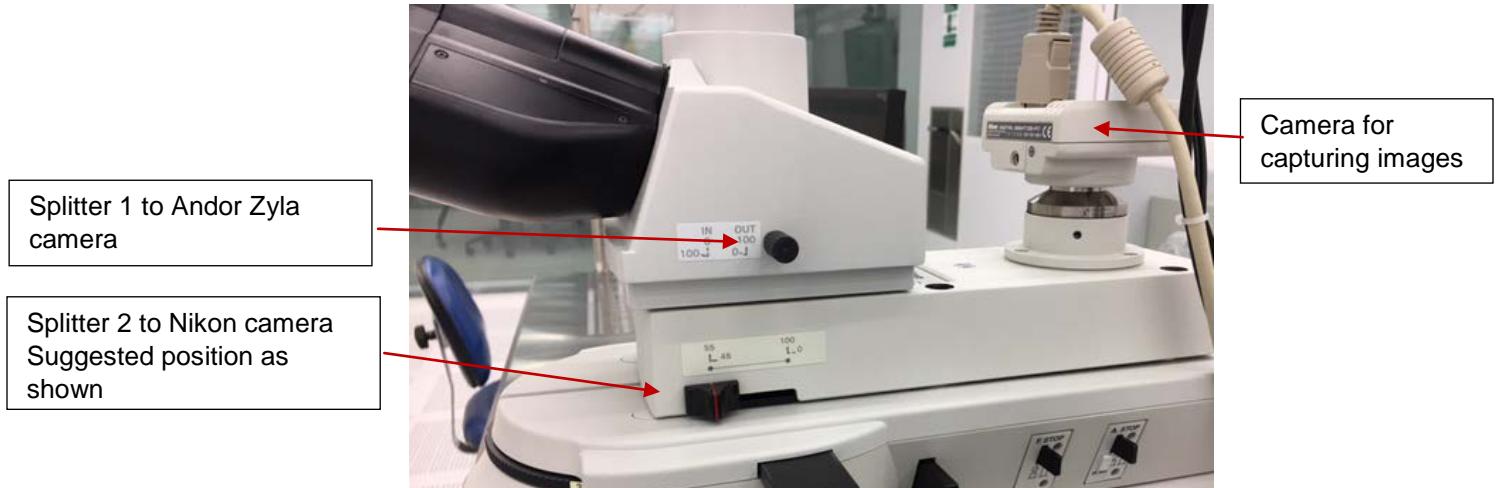


Figure 7. Observe using eyepiece and camera

- 5) Start camera software ‘NIS\_Elements’ on desktop. Make sure the ‘Live’ mode is selected (Figure 8). Adjust the focus slightly to obtain the best image on the screen.
- 6) To add a scale bar on the image, press the button ‘Scale’ in the up right corner (Figure 8). It’s important to **match the magnification on the scale bar with the lens in use**.  
**Note:** Add the scale bar in live mode. Once captured, the magnification on the scale bar cannot be changed.
- 7) The resolution (in the unit of pixel) and exposure time can be adjusted on the right of the screen. Figure 8 shows the default and suggested settings.
- 8) Press ‘Capture’ (Figure 8) to capture the image.
- 9) The scale bar can be dragged and placed anywhere on the image. To change other properties of the scale bar, go to View -> Scale -> Scale bar properties (Figure 9).

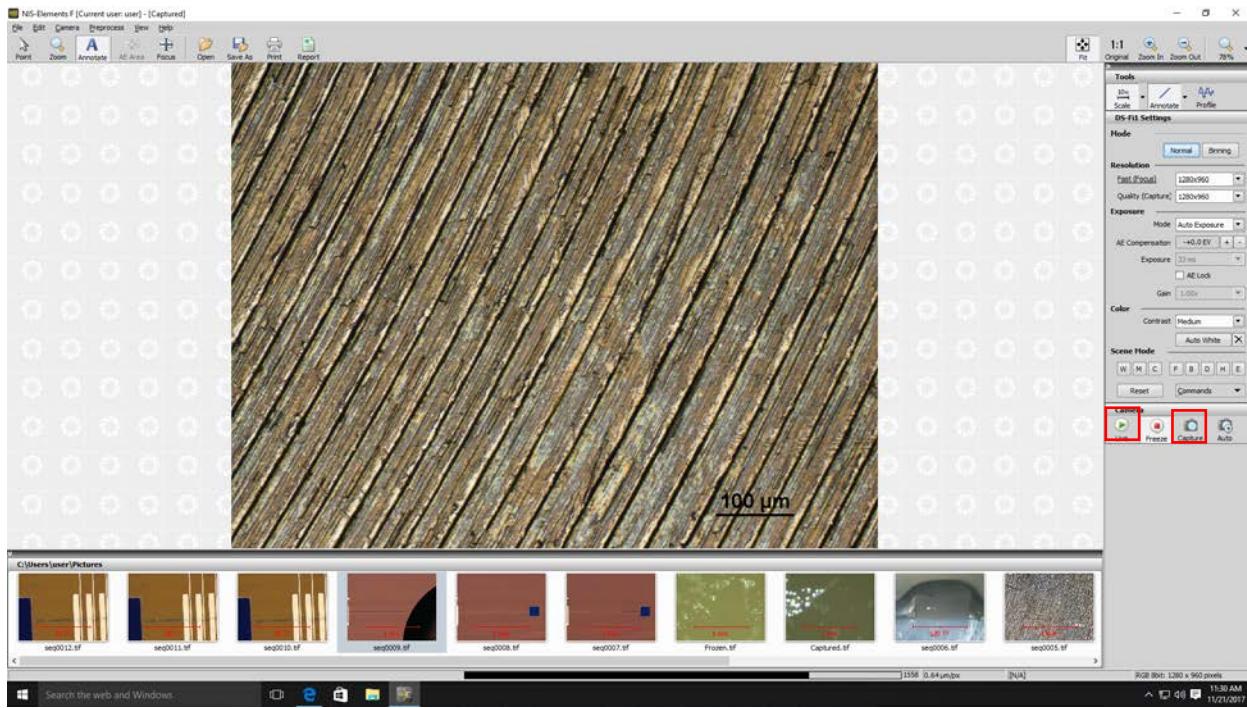


Figure 8. The camera software interface.

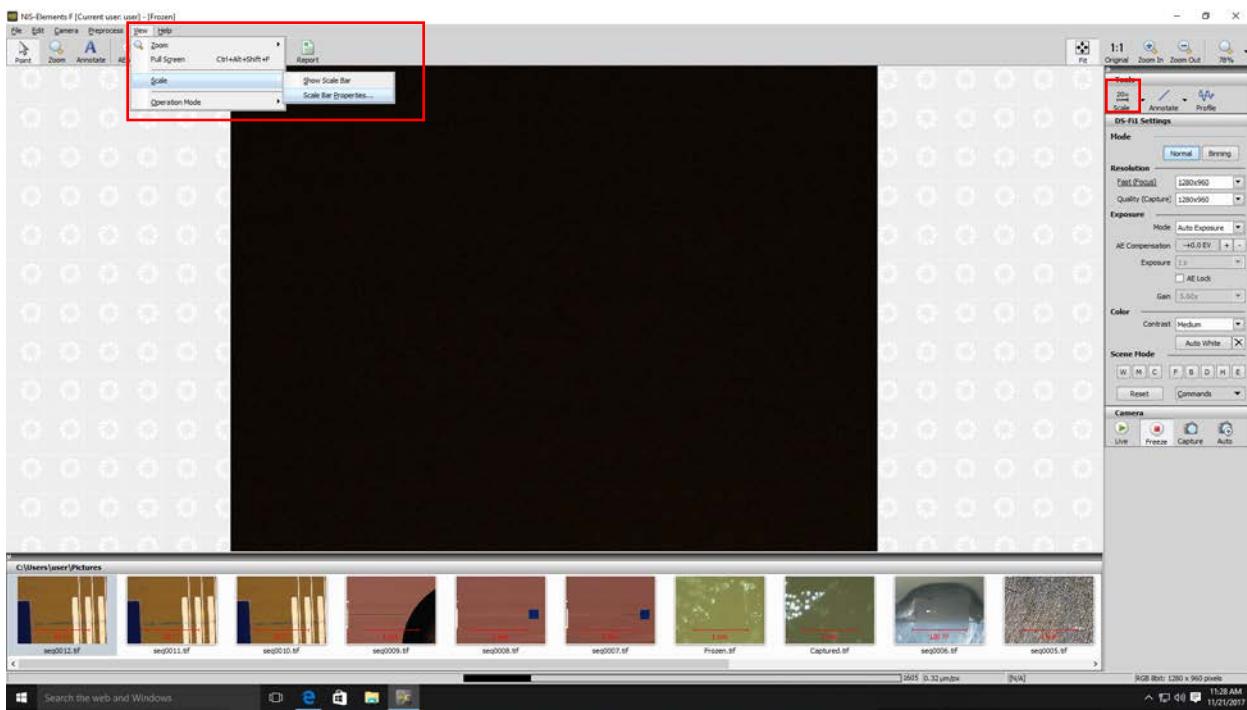


Figure 9: Change the properties of the scale bar.

- 10) To measure the size of a feature, select the ‘Annotation’ near the ‘Scale’ (Figure 10). Draw a line through the feature. Double click on the line. The length of the line can be read in the unit of pixel (Figure 10). Similarly, draw a line through the scale bar, and read the length of scale bar in the unit of pixel. The length of the feature can be calculated.

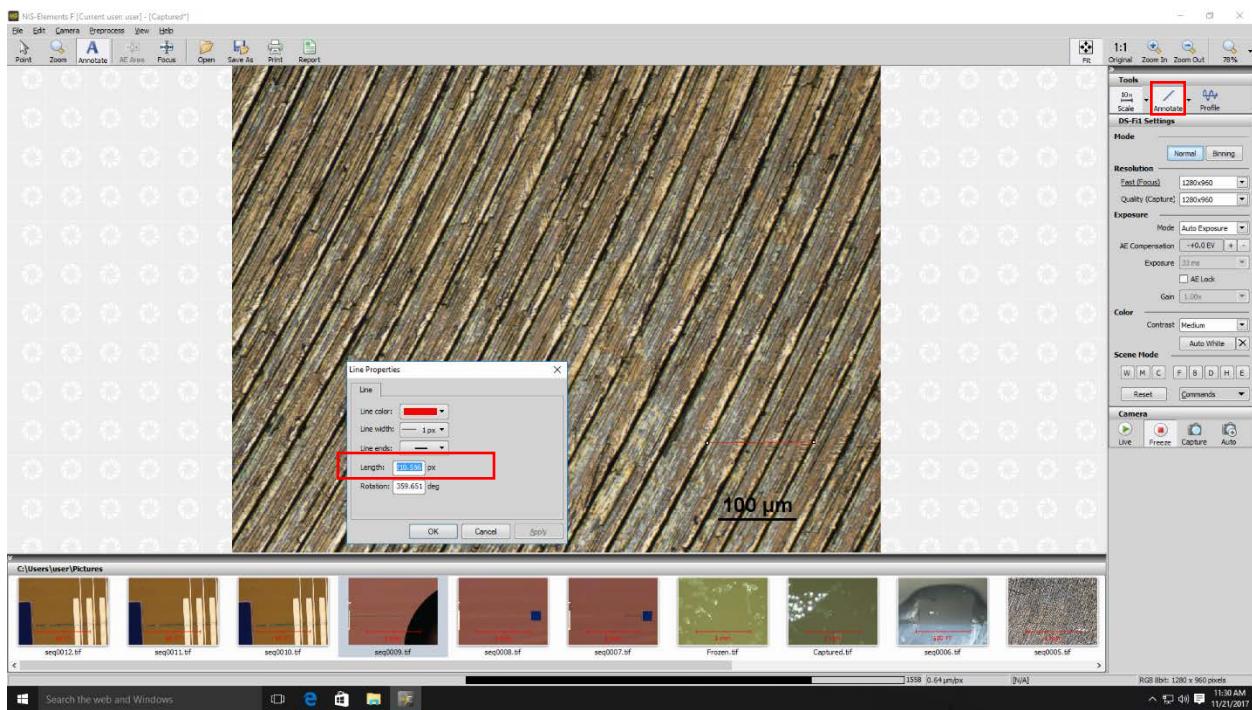


Figure 10: Measure the size of a feature.

- 11) To save the image, go to file (in the up left corner) -> save image. Use USB to transfer the images.

**Note:** The Andor camera can capture images and record videos in a very fast speed (upto 100 frames/sec). However, the images are black and white. A typical application is to measure the speed of fluorescent moving particles. Please contact staff if you need to use this camera.

- 12) Lower down the sample stage by turning the coarse focus. Turn off the light by pressing the on/off knob in Figure 2. Unload the sample.
- 13) Log off in FOM.