CORAL Name: Microscope-Inspect-4k & Microscope-Inspect-HD

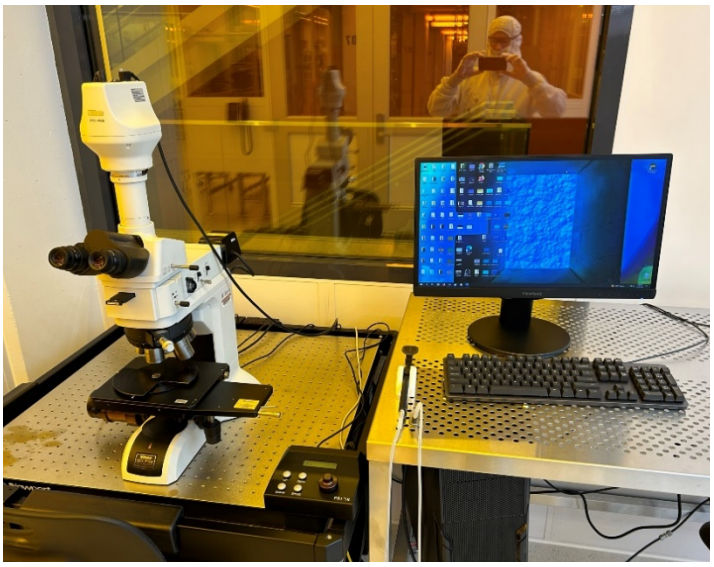
Location: Upper Cleanroom Main Aisle, end of U8 and U12
Purpose: Metrology and Inspection
Contact: Scott Poesse

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Introduction

This microscope (Model: Nikon LV150NA) can be used with 6-inch wafers and anything smaller. It has a motorized Z stage (focus) which can be operated manually or with the control pad and is on a vibration isolation table. The microscope has an overall 10x magnifier built in with 5x, 10x, 20x, 50x and 100x objectives to increase magnification further. Objectives are selected manually by rotating the turret. The microscope is connected to a computer where images may be taken and stored. The computer is connected to the internet so images may additionally be saved to drop box, webmail or USB drive.



Safety

- The system has pinch points when the stage is moving, including when the automatic Z stage is in motion. Take care to avoid these pinch points when using the microscope.

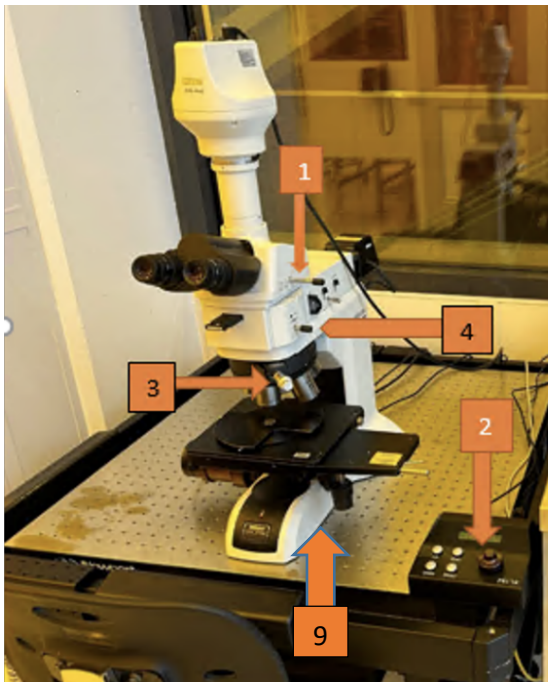
- When moving the z-stage to focus, take extra care to avoid crashing a sample into the objective. Start at the lowest magnification and work up to higher magnification.

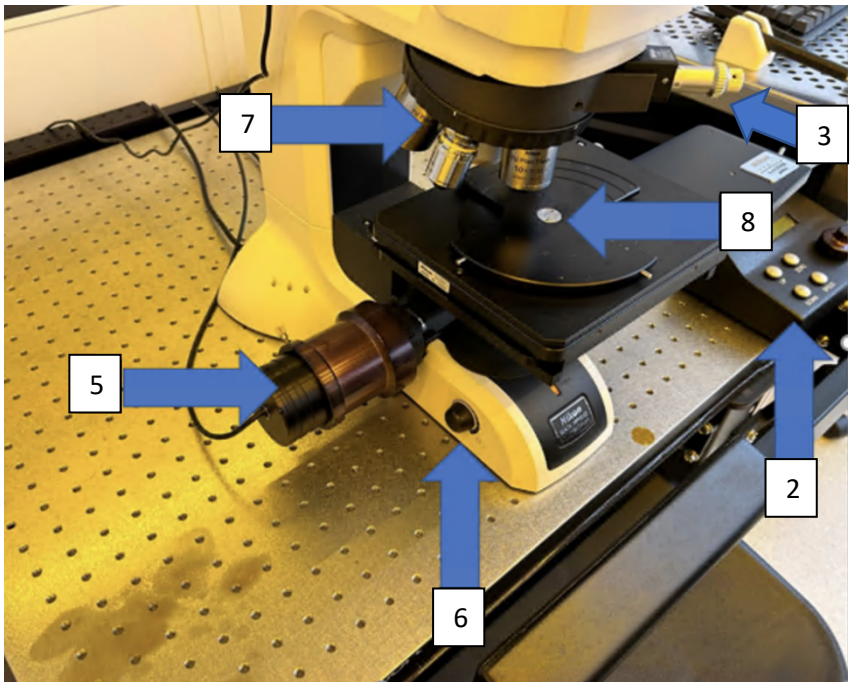
User Qualifications and Responsibilities

- Users must return the objective to the lowest magnification before loading or unloading samples. The lower magnification objectives have a larger clearance from the stage and this will avoid accidental scratching of the optics.
- Users must turn the light source off when finished, this will prolong the life of the bulb. The light source status is indicated by a green/orange LED indicator on the front of the microscope. The LED will be orange when the light source is off.
- Users must rotate the turret from the top, not by holding an objective, to prevent objectives from loosening and becoming misaligned. User can also rotate the turret by pushing the objective buttons shown in **Appendix A**.

Operating Procedures

1. Turn on the microscope lamp by turning the knob (**6**) clockwise. The knob will click to turn on and brightness can be adjusted by turning the knob further.
    a. For photosensitive samples, use the UV-cutoff filter (**1**)
2. Before loading a sample, ensure the 5x objective is in the viewing position. Always start on low magnification.
3. Place the sample on the stage (**8**) and center under the objective with the X-Y positioner (**9**)
4. Look through the eyepieces, and carefully focus on the sample. Course and Fine focus adjustments can be made with the knobs shown.
    a. The Microscope-Inspect-HD has manual knobs for focus adjustment.
    b. The Microscope-Inspect-4k has an automatic Z stage controller (**2**). Choose a speed and turn focus knob until sample is focused.
5. To increase magnification switch to the next objective (**3**) and re-focus. Continue increasing magnification (refocusing each objective) until the desired magnification has been achieved. Maximum magnification is 1000X with 100x objective.
6. To create and save the image, see **Appendix B.**
7. To take measurements, see **Appendix D**.
8. For Extreme Depth of Field (EDF) imaging, see **Appendix F** (Microscope-Inspect-4k only).
9. When finished, carefully return turret position to lowest magnification (5x).
10. Lower the stage.
11. Remove sample.
12. Turn the lamp knob counterclockwise until it clicks to turn off the lamp. The LED indicator will turn orange.
    a. NOTE: Microscope power should always be on. However, if it is off, the power button is located in back.



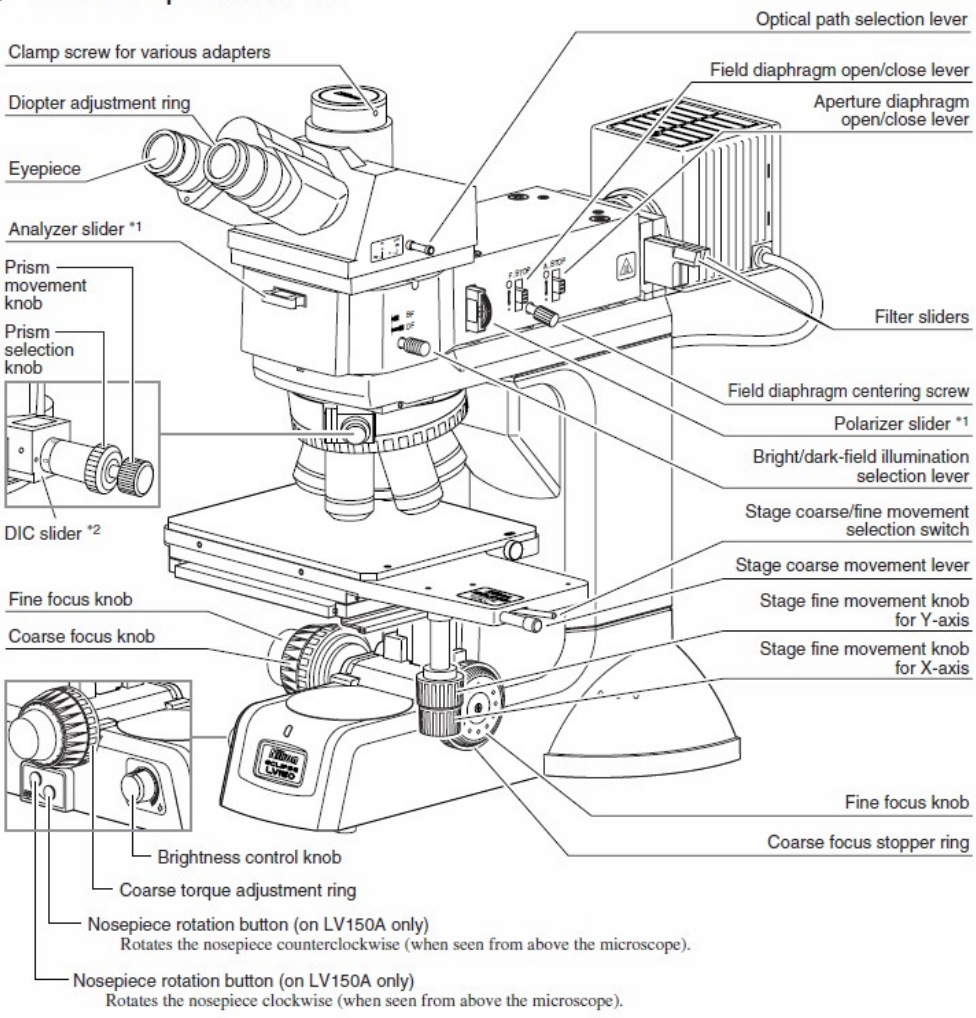


Microscope Component Descriptions

1. Camera eyepiece select lever. Pull out for viewing with camera; push in for viewing with eyepieces.
2. Z stage controller. **Use caution: ensure sample is not touching objective.** See **Appendix E** for additional details.
3. Nomarski (DIC or digital interference contrast) attachment. See **Appendix B** for operation.
4. Bright field/dark field" Push in for dark field, out for bright field.
5. Motorized focus knob. Do not use. Use Z stage controller (#2) instead for focusing the scope.
6. Light control.
7. Objective turret. May be moved manually or with buttons shown in **Appendix A**. Do not turn while holding objective. Watch for collisions.
8. Sample stage (Z stage).
9. XY stage control.

Appendix A: Microscope Detail

▶ **Names of Operational Parts**

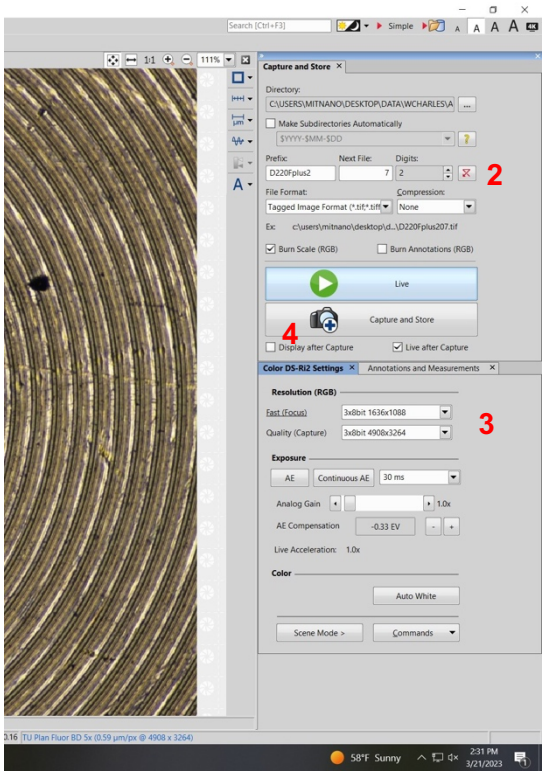


*1: For DIC microscopy or simplified polarization microscopy.
*2: For DIC microscopy.

Appendix B

To create and save an image

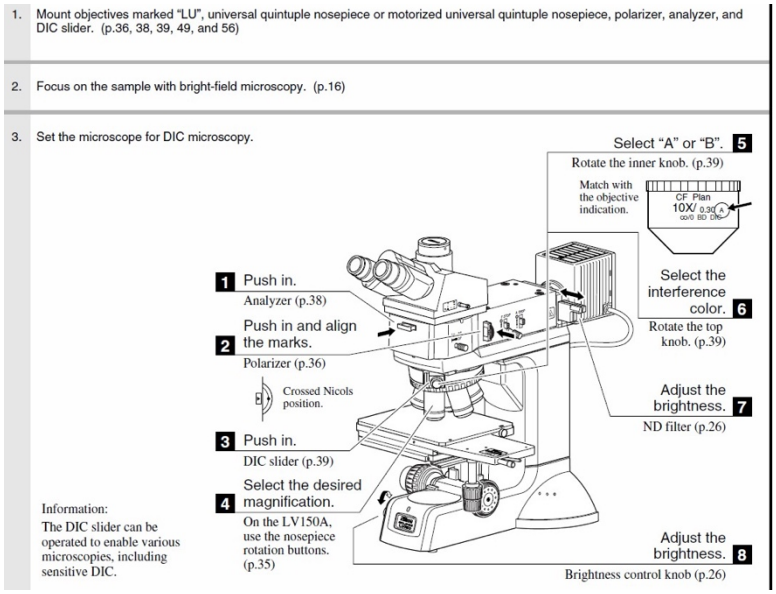
1. Open the Nikon Elements app on the computer.
2. Choose a location for the file(directory).
3. Choose image resolution and camera exposure time for best camera response.
4. Press Capture and Store
5. File is now saved to chosen directory.
6. To share file simply use Dropbox or webmail account.



Appendix C

DIC instructions (Nomarski)

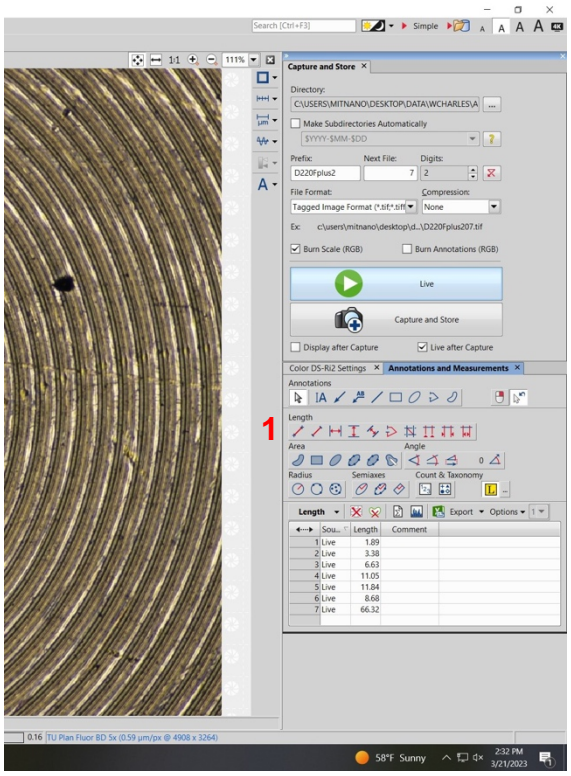
1. Focus on sample in normal, bright-field microscopy mode.
2. Push in the Analyzer (**1**) and push in the Polarizer (**2**).
3. Push in DIC slider (**3**). Select “A” or “B” on the inner knob of the objective.
4. Adjust the brightness and interference color as needed (details in the image).
5. To return the microscope to normal bright-field mode, pull out: Analyzer, Polarizer, and DIC slider.



Appendix D

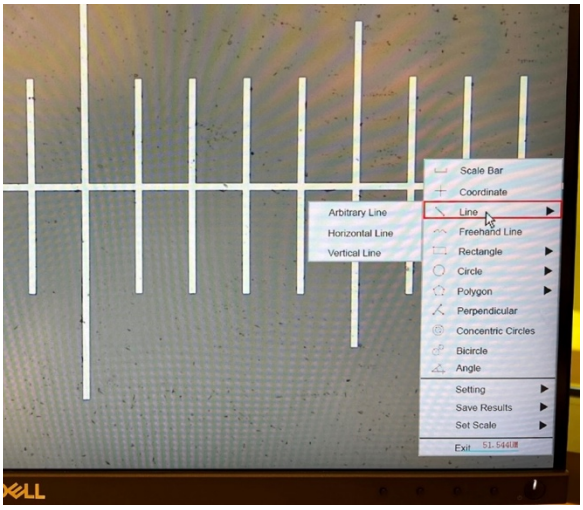
Making measurements on Microscope-Inspect-4k

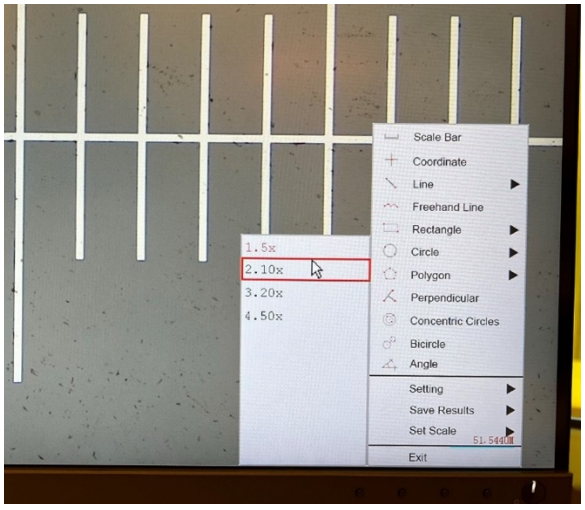
1. Choose length (**1**) from the menu.
2. Place cursor on edge of feature to be measured.
3. Drag cursor to other edge of feature.
4. Length will be displayed upon release mouse button.
5. Other parameters can similarly be measured, such as angle or area.



Making measurements on Microscope-Inspect-HD

1. Right click on the screen and choose setting.
2. Choose the current objective.
3. Right click again on the screen and choose line.
4. Select which type of line: arbitrary, horizontal, or vertical
5. Click pointer on screen, move to new location and release. Measurement will be displayed in ums





Appendix E

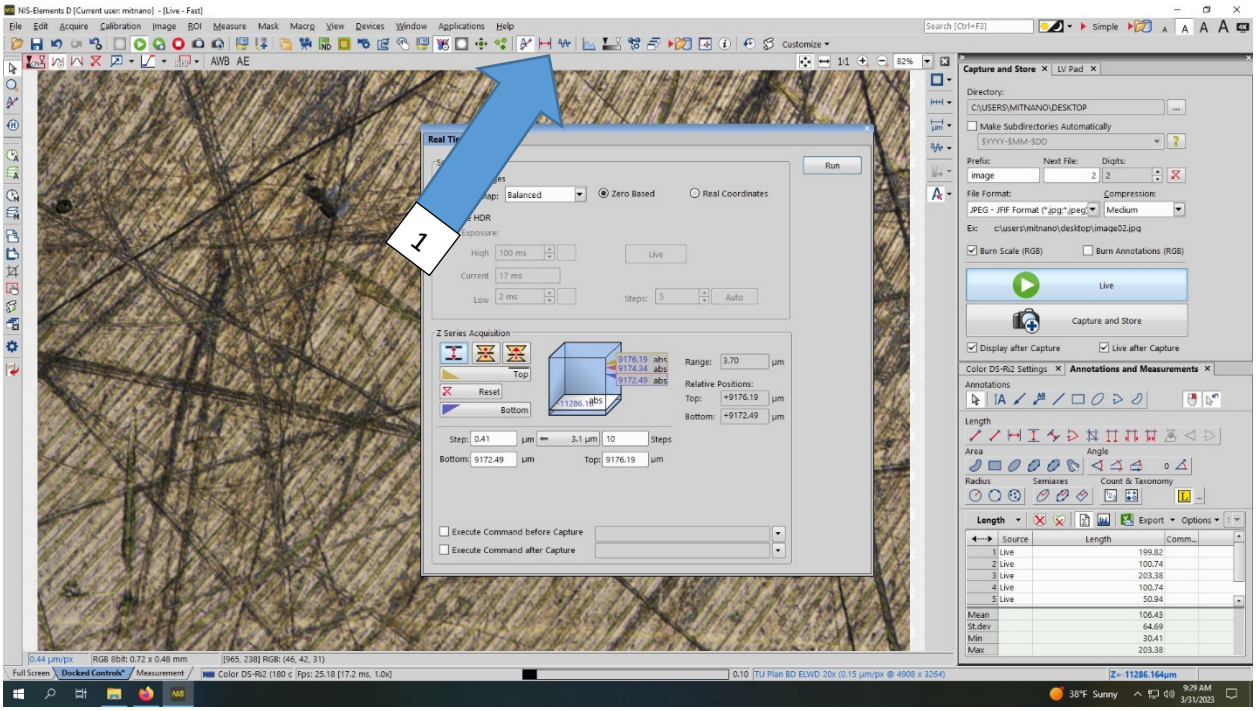
Z stage controller (stage up and down).

1. Rotate right to move stage up, left for stage down
2. Labeled speed, this toggles between L, M, H (low, medium, and high) speeds
3. Labeled up, this move the stage up
4. Labeled down, this moves the stage down
5. Display shows stage Z speed and position



Appendix F

Extreme Depth of Field (EDF) Microscopy



1) From Applications choose Real Time EDF.
2) Follow instructions below…

MIT.nano	Microscope-Inspect	
	User Standard Operating Procedure	
	Last revision: 06/7/2023	Version: 1.0 Scott Poesse

