HYSPIM MICROSCOPE

HyperSpectral Imaging Microscope

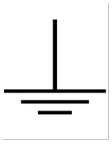
User Guide

Table of Contents

HYSPIM MICRPSCOPE

Chapter 1 Warning Symbol Defini ons

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Descrip on
	**Direct Current**
	**Alterna ng Current**
	**Earth Ground Terminal**
	**On (Supply)**
	**Off (Supply)**
	**Cau on: Risk of Electric Shock**
	**Cau on: Burn hazard, Hot Surface, Do not touch**
	**Cau on: Do Not Look Directly At Light**

Chapter 2 Safety

All statements regarding safety of opera on and technical data in this user guide will only apply when the unit is operated correctly. Please read the following warnings and cau ons carefully before opera ng the device

WARNING

Do not open the controller, electronic housing and detector module. There are no repairable parts in these products. Do not perform maintenance or service on the instrument unless specifically stated. Any modifica on or servicing of this system by unqualified personnel shall absolve of any liability. Only personnel authorized by and trained in the maintenance and repair of this equipment should remove any covers or enclosures or a empt any repairs or adjustments.

WARNING

The power supply supplied with this system is specifically designed for this system, do not replace or use in other devices.

Chapter 3 Descrip on

The hyperspectral imaging microscope (HYSPIM) technique integrates the benefits of hyperspectral imaging (HSI) and microscopic imaging. HYSPIM offers both spa al and spectral informa on on substances, as well as their chemical composi on at the molecular or cellular level. This makes HYSPIM a promising tool for nonde-struc ve sample evalua on in various fields such as medicine, pathology, pharmaceu cals, life sciences, and the food industry .

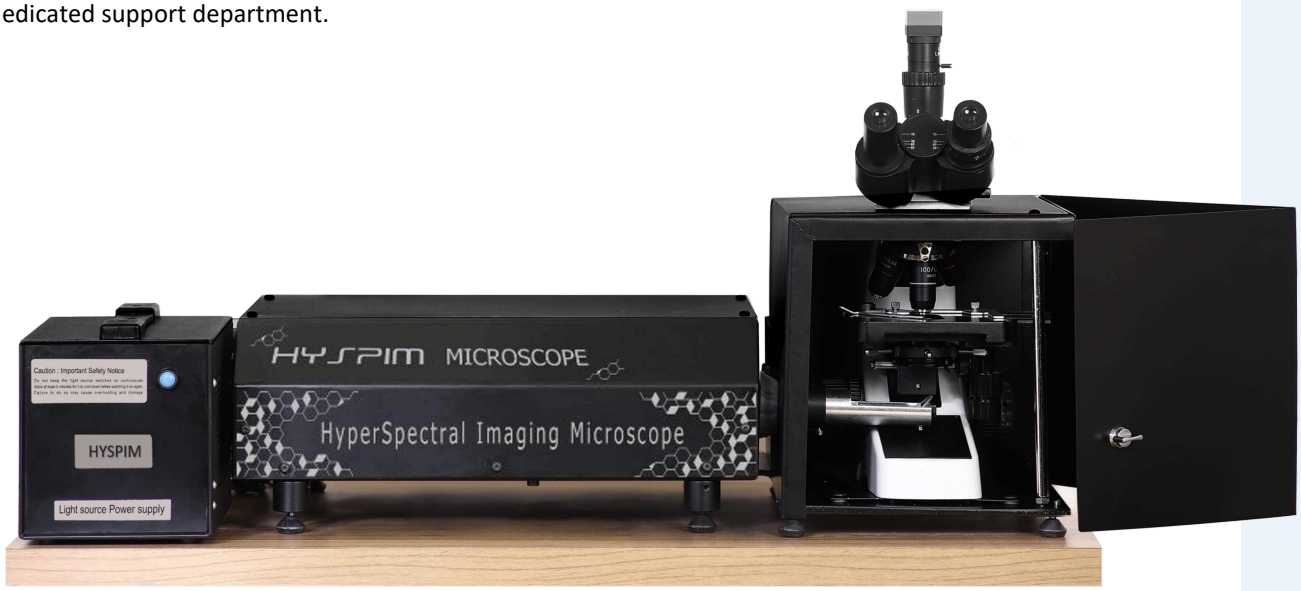
The HYSPIM microscope system is designed with a special and precise op cal system and an excellent mechani-cal system, which enables narrow spectral regions to be imaged individually.

A monochrome camera helps to obtain images with li le spectral data for each pixel. Since the mechanical system has a very low error rate and does not move or swap during measurement, the data is not subject to pixel shi ing or image registra on issues.

The HYSPIM microscope comprises three key elements: a variable light source, a microscope, and so ware. The variable light source covers a spectral range from 400 nm to 1000 nm, with a spectral bandwidth of 6 nm. This source directs light to the microscope, posi oned before the condenser lens. Here, the light undergoes reflec-on by a 45-degree mirror before illumina ng the sample. Subsequently, a high-resolu on camera integrated into the microscope captures the sample image.

The HYSPIM microscope is paired with sophis cated so ware that ini ates the imaging process. This involves modifying the light source's wavelength while simultaneously recording the sample image, resul ng in the con-struc on of a data cube. The en re process seamlessly synchronizes with the so ware. Addi onally, users can manually select a specific wavelength, facilita ng the capture of a single image with a 6 nm bandwidth. This capability proves valuable for real- me examina on of the sample under a specific narrow-band light source .

For users who prefer to u lize their exis ng microscope, the HYSPIM system provides the op on to separately purchase the light source, so ware, and camera. For inquiries regarding this op on, please reach out to our dedicated support department.

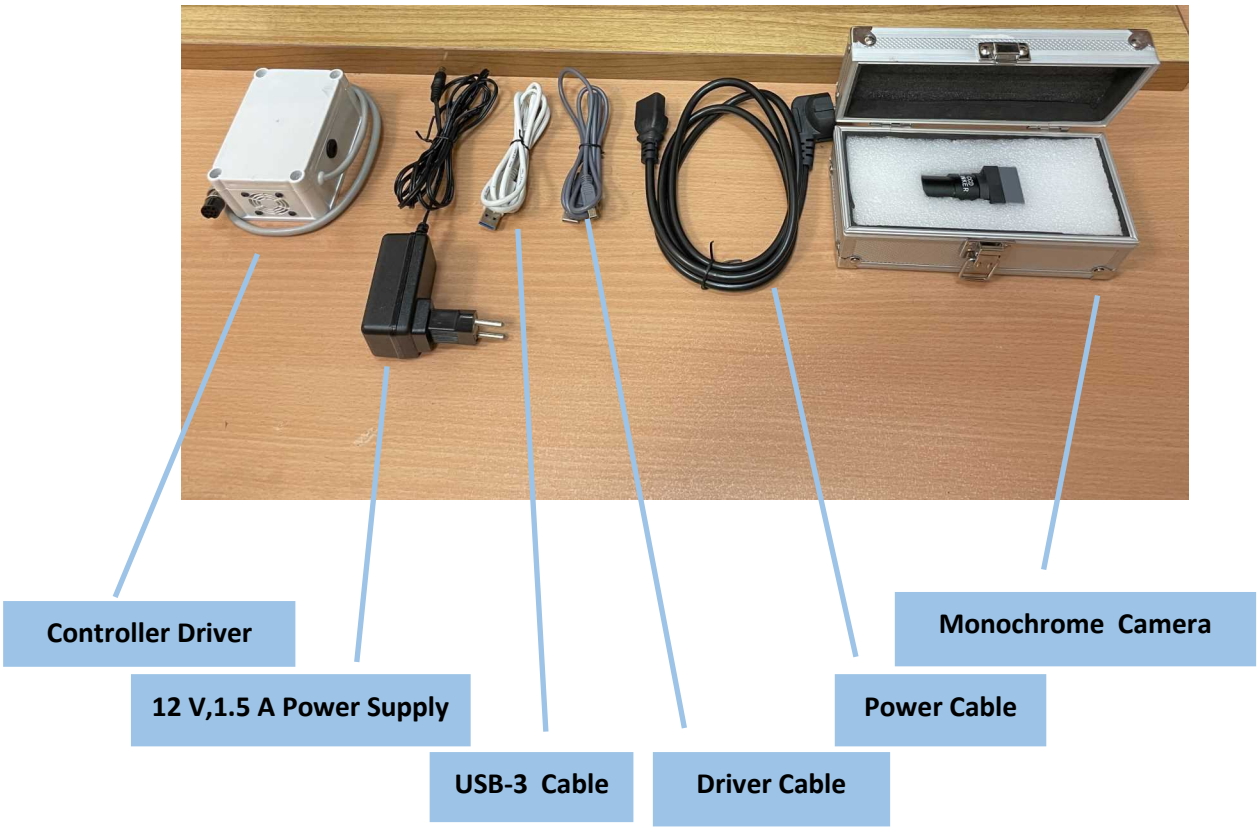


3.1. Specifica ons Overview

SPECIFICATIONS	VALUE
Spectral Rage (nm)	Sensi ve from 400 to 1000 nm
Spectral resolu on	6nm spectral resolu on (100 Spectral channels)
Spa al resolu on	limited by the microscope objec ve NA
Imaging method	Fast global mapping (snapshot)
Camera Type	CMOS Monochrome _Basler camera
Number of Ac ve Pixels	3800(H) x 2178 (V)
Pixel Size	2.5 µm x 2.5 µm
Ver cal Hardware Binning	Con nuous Integer Values from 1 to 4
Horizontal Hardware Binning	Con nuous Integer Values from 1 to 4
Exposure Time [us]	51.0 to 1000 ms
Power Supply	Input : 230 V — 50 HZ Output : 24 V— 10 A
Halogen lamp	24.0 V— 250 w
Color temperature	3550 K
Weight	≈ 45 kg
Dimension	85 cm × 45 cm × 45 cm (L,W,H)
So ware	Python(windows 10&11)

Chapter 4 Ge ng Started

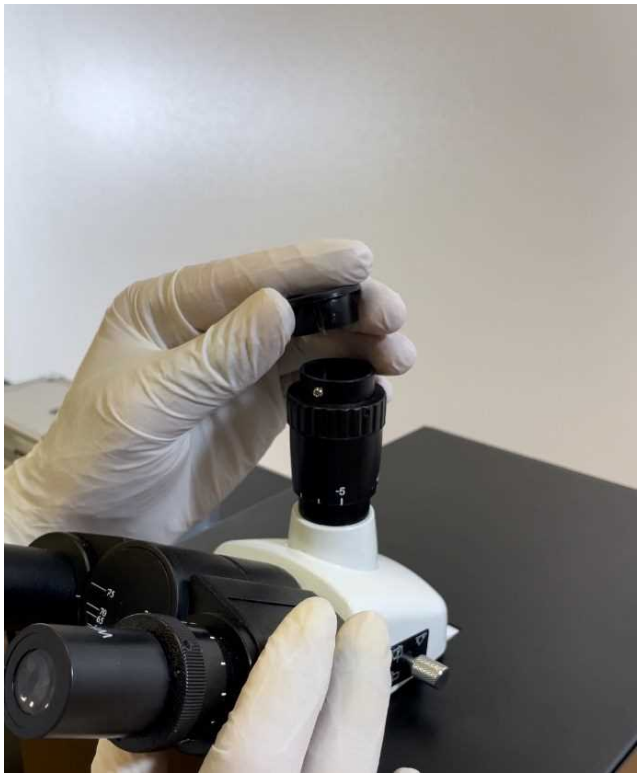
4.1. General Setup



4.2.1. Se ng up the HYSPIM

1. Turn the microscope head to a suitable posi on

2. Remove the cap



3. Take the camera

4. Put the camera on the microscope and ght the screw. In the next sec on there is an instruc on to tune the direc on of the camera

5. Plug the power cord to the light source power supply

6. Plug the cable from light source to the power supply

7. Plug the cable from driver box to the HYSPIM

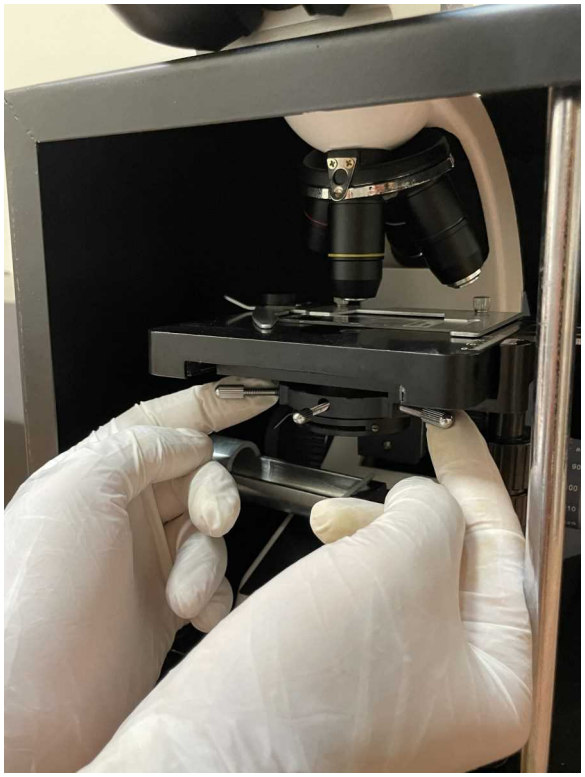
8. Plug the cable from power supply adapter to the driver box

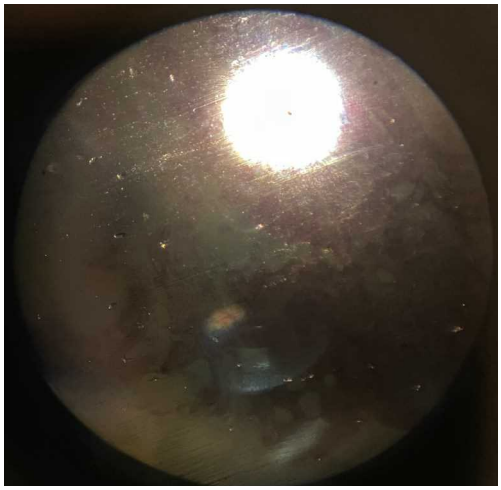
9. Connec ng the communica on cable of the HYSPIM controller to the driver box

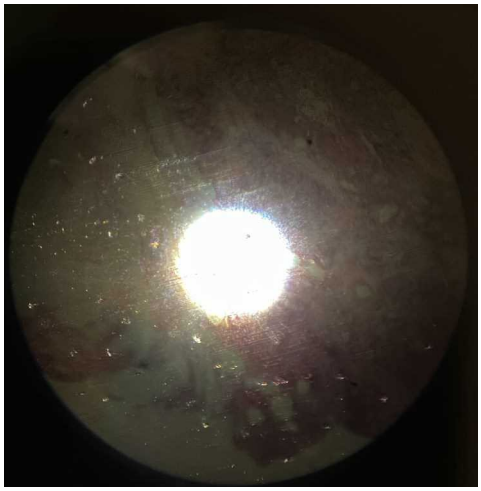
10. Connec ng the camera cable to the camera

4.2.2. System prepara on

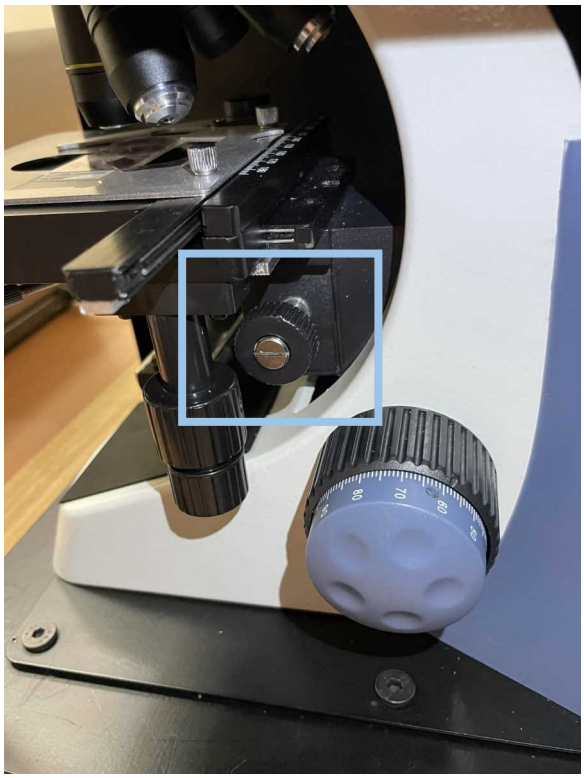
1. In the first step, you should adjust the central spot of light in the middle of the eyepiece of the microscope by means of the condenser adjustment screws

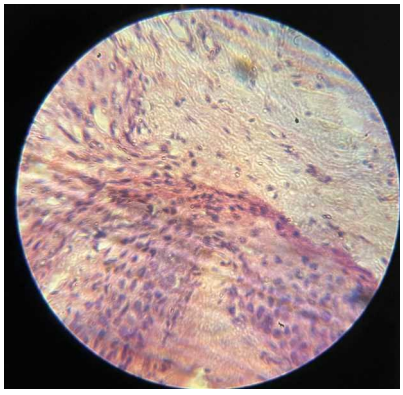


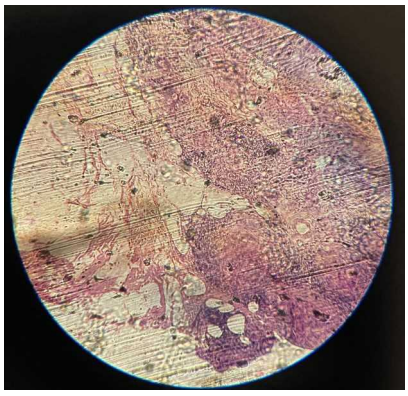




2. Then, using the height adjustment screw of the condenser, spread the light evenly so that the en re field of view of the objec ve is illuminated and the sample can be seen well.



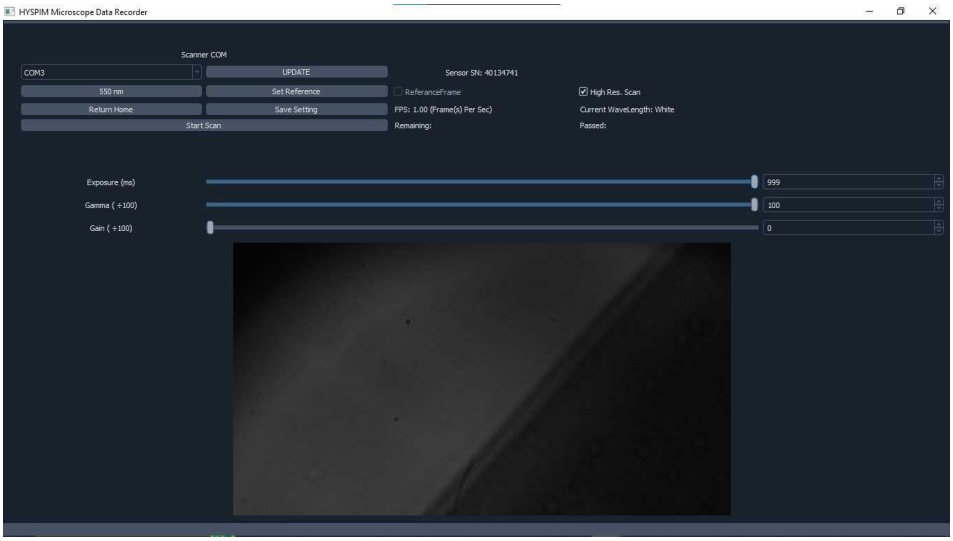


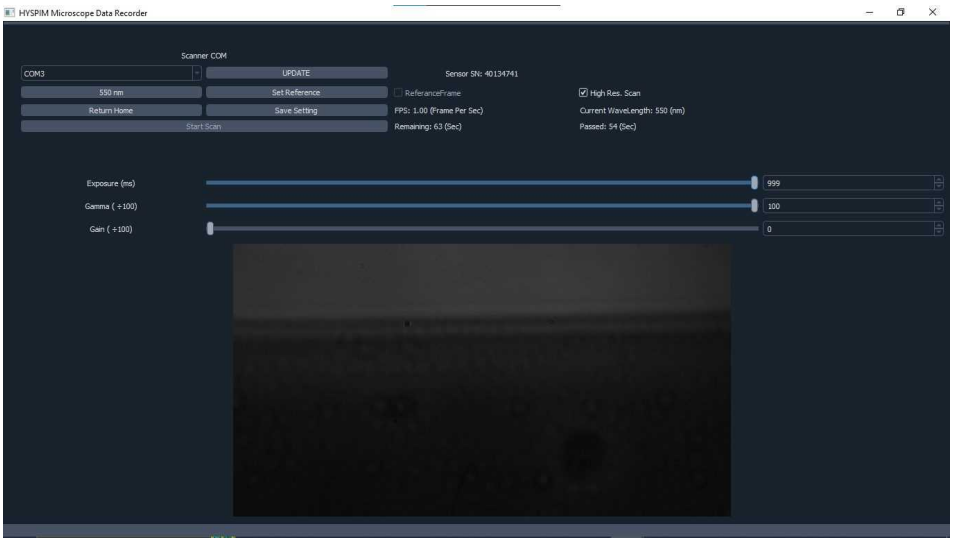


NOTE

Note that all the above steps must be performed for different microscope objec ves.

4. In the last step, you need to set the direc on of the camera. First set the wavelength to 550 nm, then wait for the system to reach the selected wavelength. Second, using a 4x objec ve, try to see the line on the slide horizontally on the so ware screen



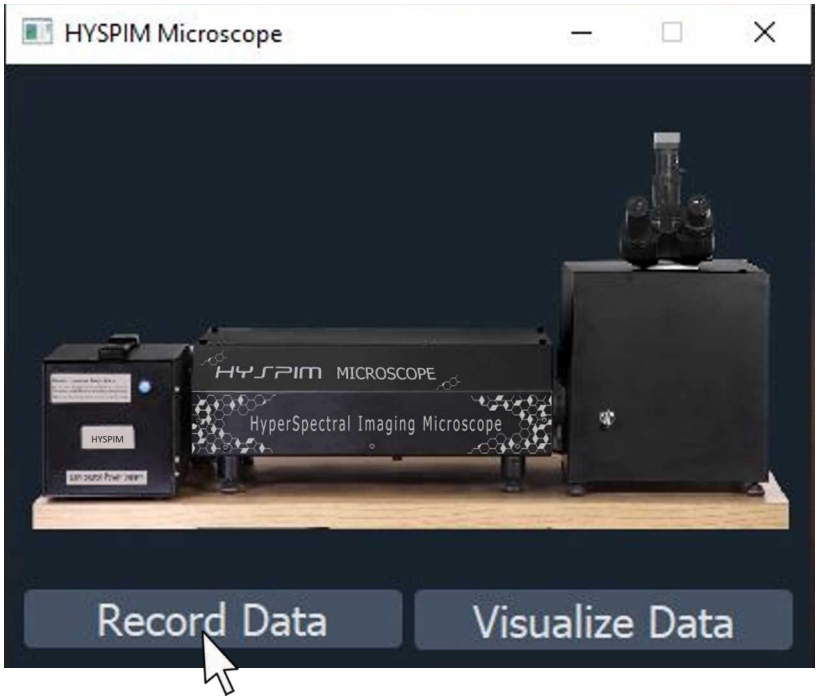


Chapter 5 Capturing an Image

5.1. Data Collec on

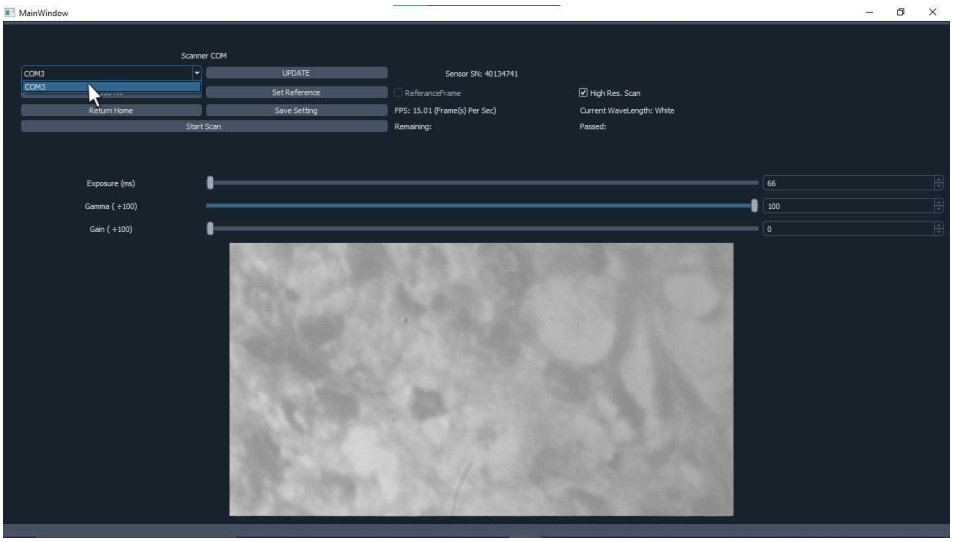
1. Open the HSIM applica on on the computer

2. Select the Record Data from the So ware window

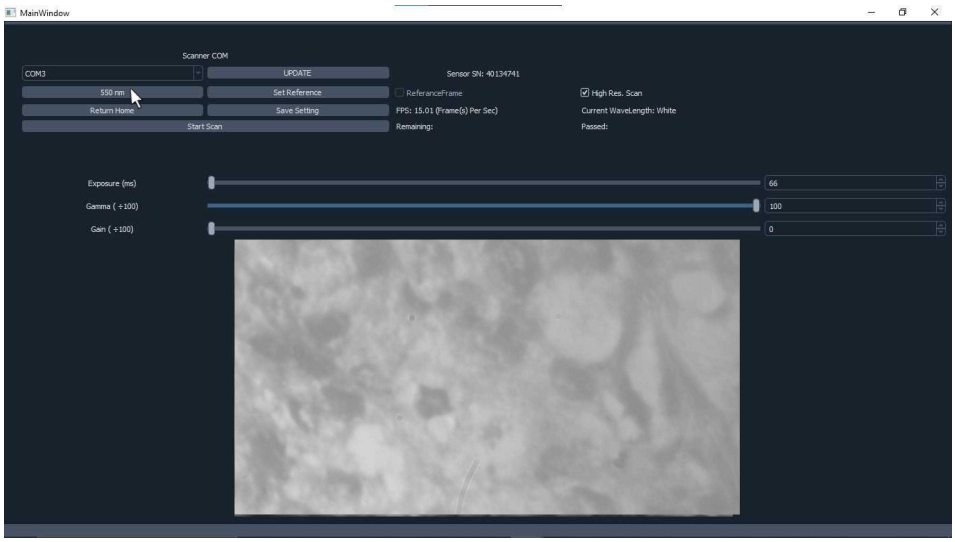


3. Please select the driver control related to the device from the so ware's "com" bu on.

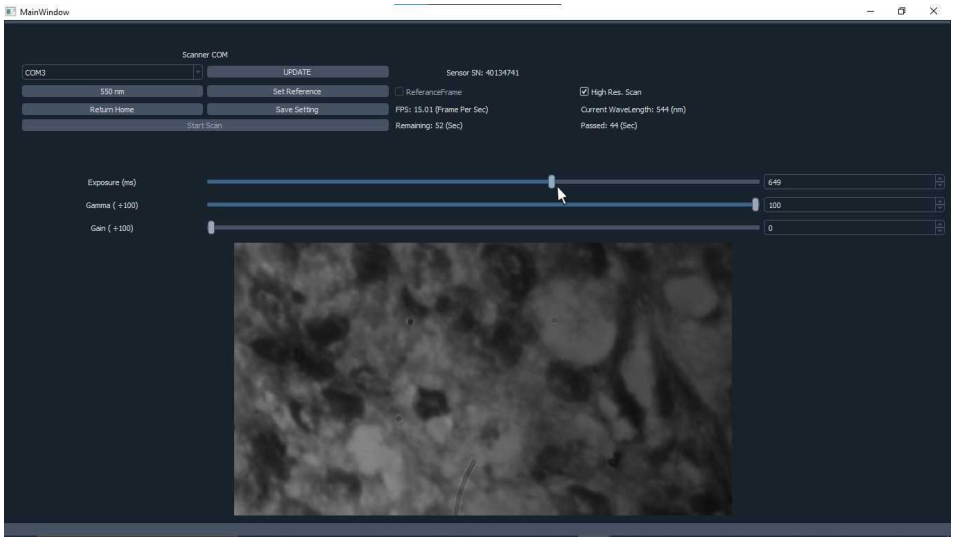
4. If you can't find the driver, click the Update bu on and try again. If the driver is s ll not found, check the device's connec on control.



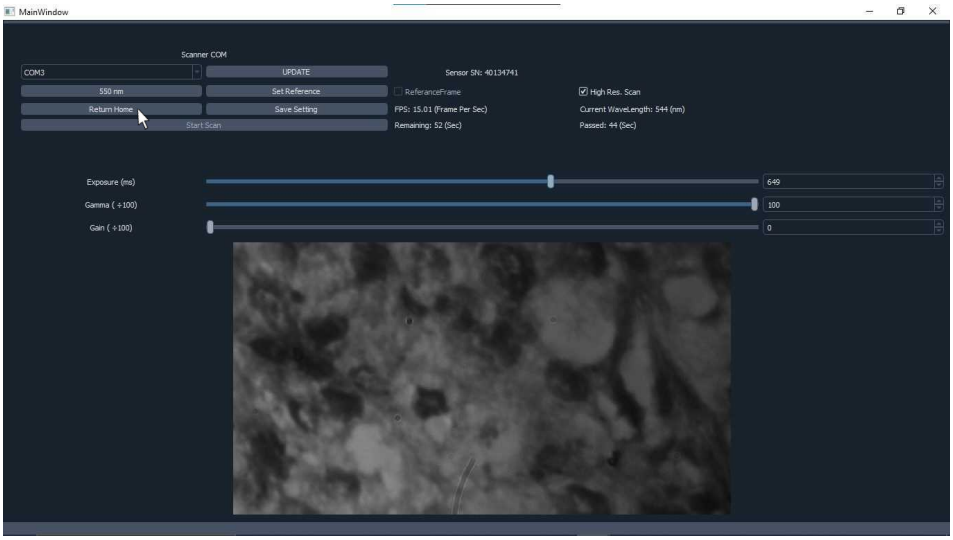
5. In the first step, you need to adjust the exposure me. First, set the wavelength to 550nm, then wait for the system to reach the selected wavelength. Second, make the necessary adjustments for exposure and gain



6. Now, by adjus ng the Exposure level, it is possible to control the image intensity .



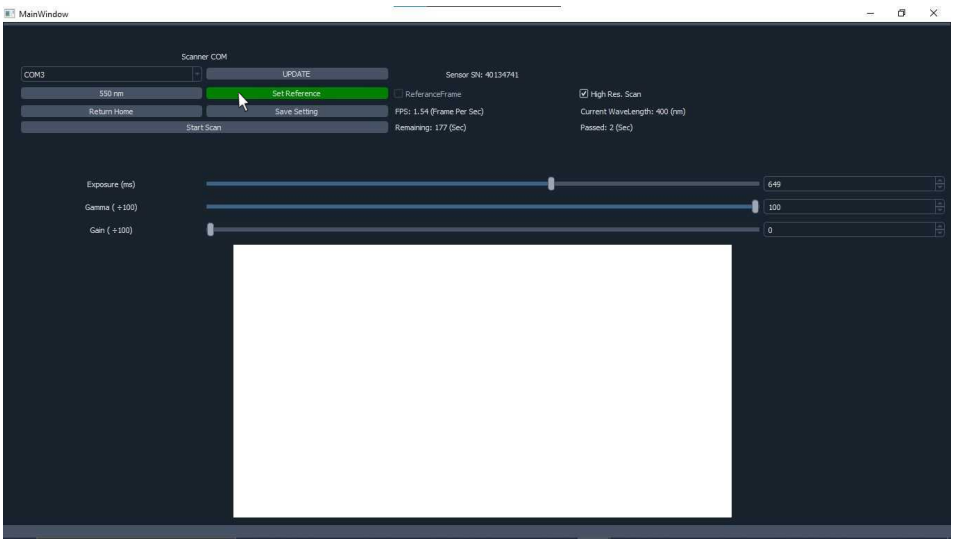
7. A er adjus ng the intensity, a) press the 'Return Home' bu on, b) change the posi on of the sample to a part where it is clear and not dirt exists, c) take the reference



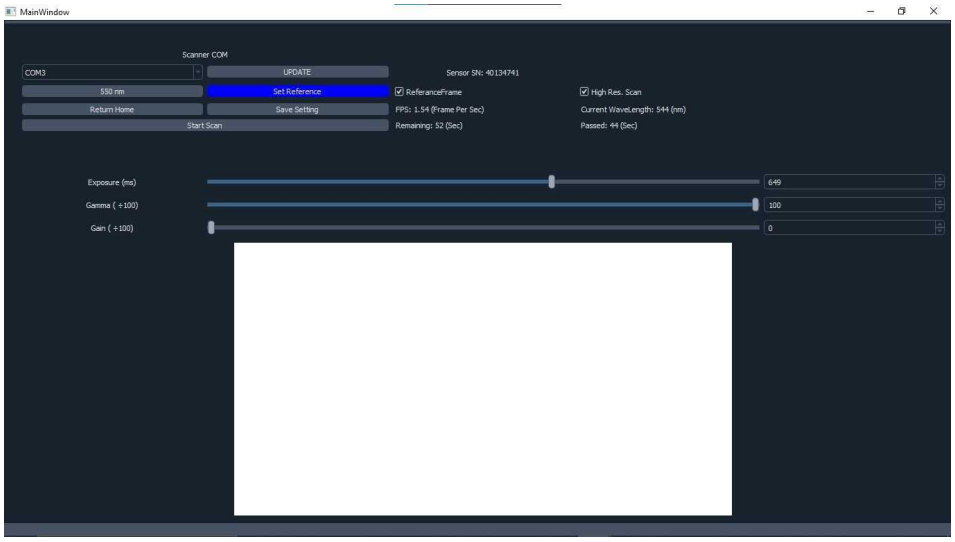
WARNING

Note that before pressing the reference bu on, the exp value must match the value set at the me of adjus ng the light with 550nm.

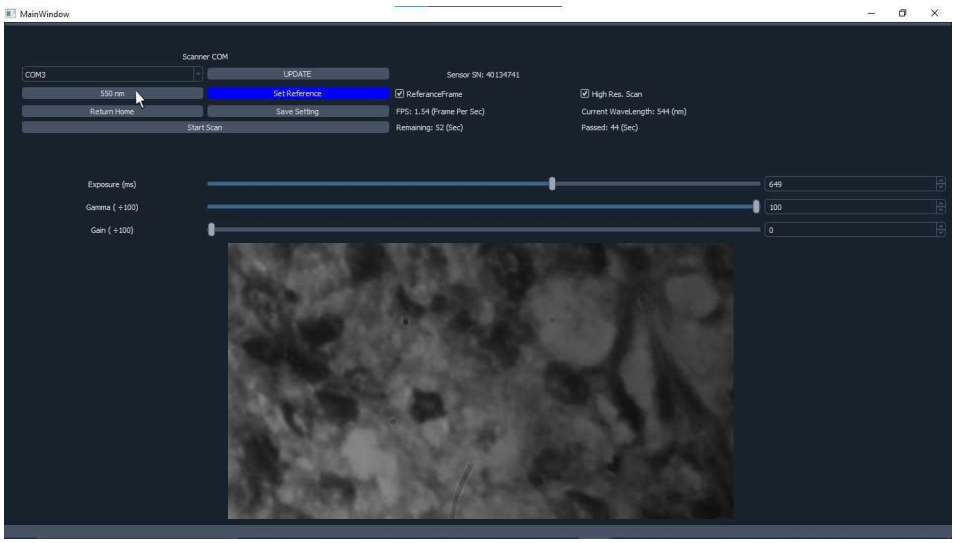
8. Press the Set Reference bu on.



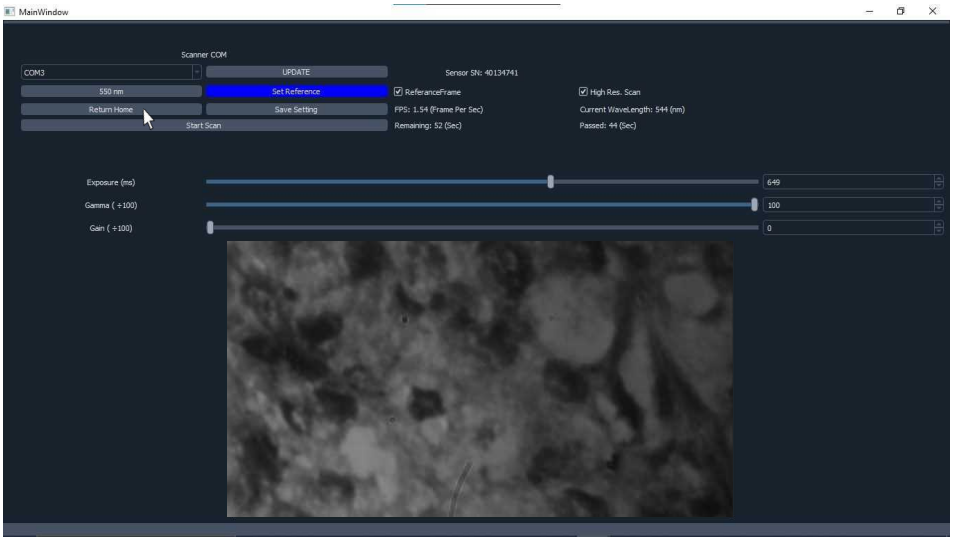
9. Wait for the 'Reference' bu on to turn from green to blue and for the checkmark to become ac ve.



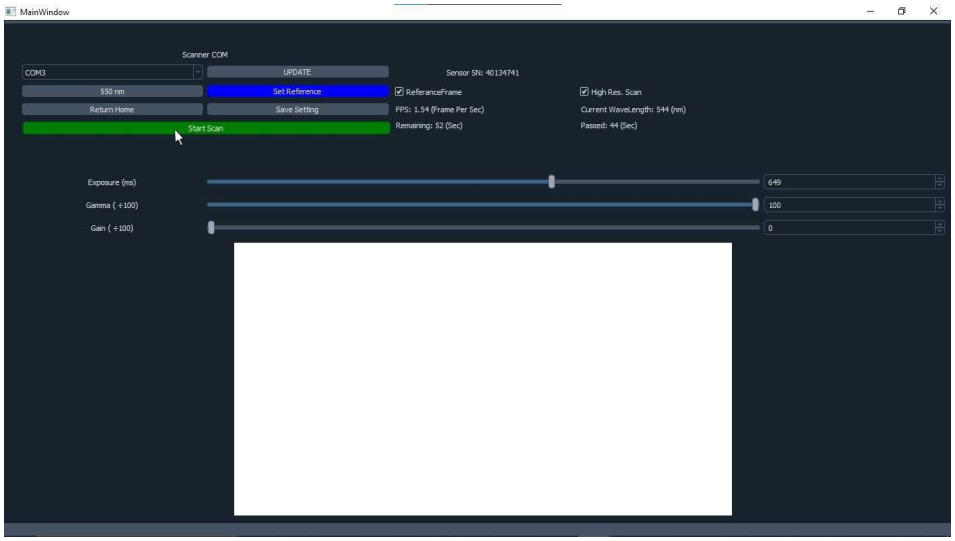
10. Press the 550nm bu on again and adjust the focus on the sample.



11. Now press the Return Home bu on.



12. Press the Start Scan bu on and wait for the data acquisi on to complete.



13. A er the window appears, you can save your data cube in the desired loca on.