thermo scientific

Nicolet RaptIR

FTIR Microscope

USER GUIDE

269-3517 00 A Revision A February 2022

ThermoFisher SCIENTIFIC

Contents

For technical support, please contact: www.thermofisher.com

For Research Use Only. This instrument or accessory is not a medical device and is not intended to be used for the prevention, diagnosis, treatment or cure of disease.

WARNING

Avoid an explosion or fire hazard.

This instrument or accessory is not designed for use in an explosive atmosphere.

1. Introduction

1.1 Intended use

The Thermo Scientific Nicolet RaptIR FTIR Microscope is a Fourier-transform (FTIR) microscope designed for use in a controlled laboratory environment, and is intended to be used with Nicolet series spectrometers.

With the RaptIR microscope, you can quickly find your target, collect high-resolution visual images, and generate high spatial resolution IR data for analysis.

OMNIC Paradigm software includes a full suite of analytical tools, customizable workflows to automate your routine tasks, and simple to use tools for microparticle analysis as well as area, point, and line analysis.

With the RaptIR Microscope, you can sample thick (up to 4 cm) and heavy (up to 5 kg) samples, and with multiple objectives and an automated nosepiece, the microscope supports a range of options for viewing samples and collecting IR data.

1.2 Disclaimer

Do not use the microscope for anything other than its intended purpose as described in this user guide.

NOTICE

Read the site and safety information for your system before using the microscope.

1.3 Conventions Used

Safety precautions and other important information use the following format:

DANGER

Avoid hazard. Indicates a hazardous situation which, if not avoided, will result in serious injury or death.

WARNING

Avoid hazard. Indicates a hazardous situation which, if not avoided, could result in serious injury or death.

CAUTION

Avoid hazard. Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Follow instructions with this label to avoid damaging the system hardware or losing data.

Note Contains helpful supplementary information.

1.4 Warranty information

Thermo Fisher Scientific warrants that each product we sell is free from defects in labor and materials and shall conform to its product specifications as defined in the product user documentation. If the product does not function as warranted during the warranty period, we will repair or replace it without charge. If in our judgment we are unable to do so, you may return it to us and we will refund your money.

This warranty replaces all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose and any other obligations or liabilities on the part of Thermo Fisher Scientific whether in contract, warranty, negligence or otherwise. Thermo Fisher Scientific shall not be liable for and disclaims all consequential, incidental and contingent damages.

1.4.1 Warranty period

The system warranty period is 12 months in the U.S.A. and Canada. The warranty period begins on the date of installation or 30 days from the date of invoice, whichever is sooner.

The system warranty period for products sold outside the U.S.A. and Canada is 12 months from the date of installation or 14 months from the date of shipment, whichever is sooner.

1.4.2 Limit of warranty

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance, or damage caused by a product for which we are not responsible will void the warranty.

Consumables are not covered under warranty.

Items Not Covered by Warranty

We do not warrant uninterrupted or error-free operation of a product. We provide certain non-Thermo Fisher Scientific products on an “as is” basis. Non-Thermo Fisher Scientific manufacturers or suppliers may provide their own warranties. A separate software warranty is provided with the software user documentation.

NOTICE

Inside the shipping box, the instrument is sealed in a plastic bag to keep the optical components dry.

You must allow 24 hours for the instrument to reach room temperature before opening the bag. If the bag is opened before the instrument reaches room temperature, moisture could condense on the optical components and cause permanent damage.

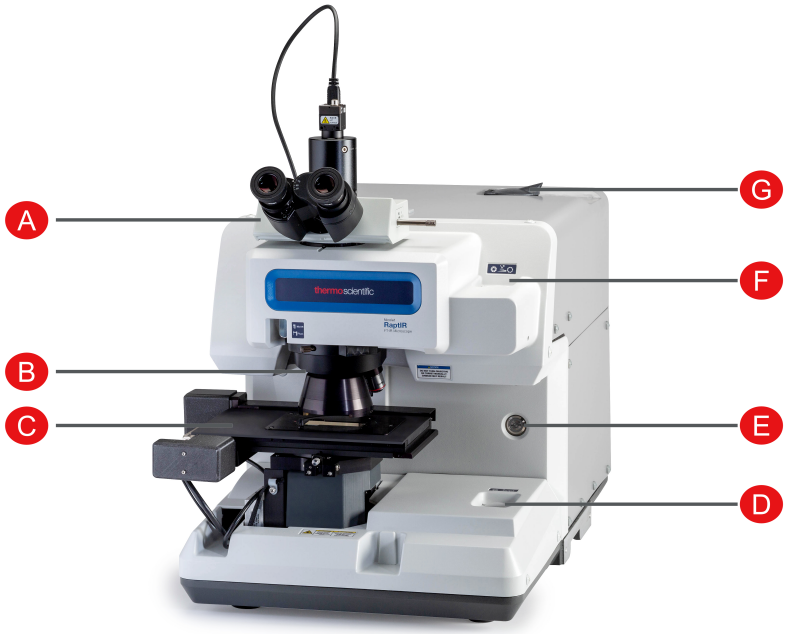
Your warranty will not cover:

- Damage due to improper moving techniques.
- Missing or damaged parts if the shipping boxes are unpacked before our service engineer installs the system.
- Damage due to removing the sealed plastic bag before the instrument has come to room temperature.

2. Overview

2.1 Features and controls

Figure 2-1: The main features of the microscope



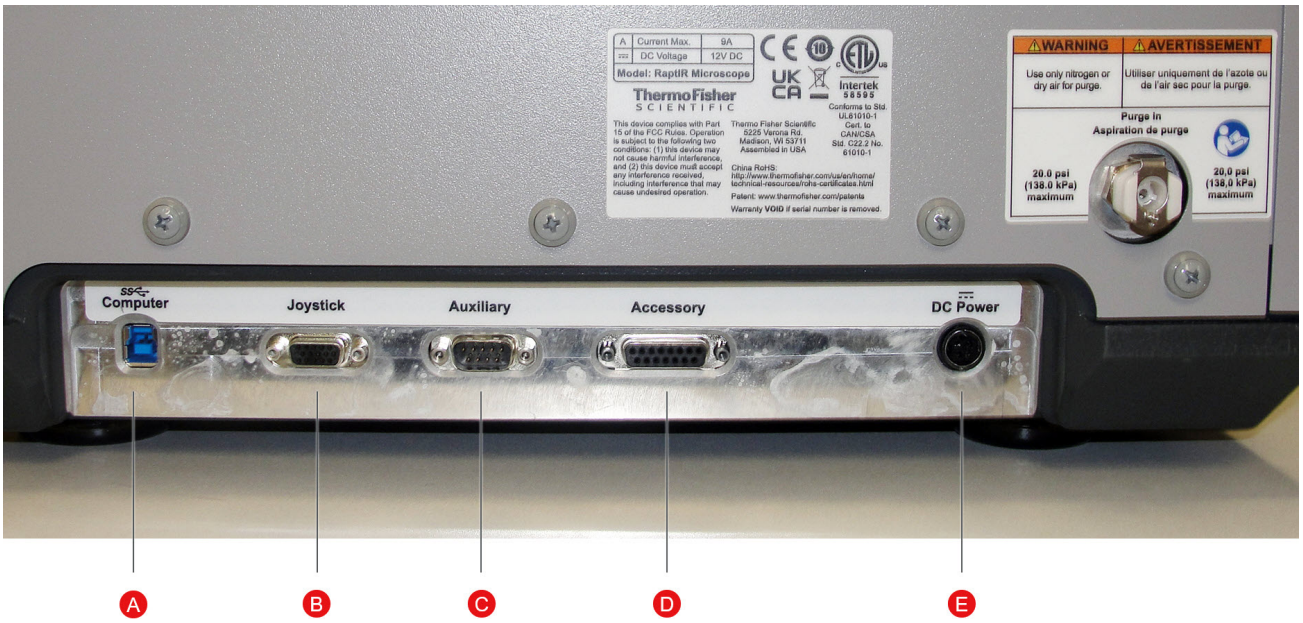
A	**Trinocular video eyepiece**	The optional trinocular eyepiece provides a visual and a video image in OMNIC Paradigm software. The monocular eyepiece (not shown) provides only a video.
B	**Rotating objective turret**	The turret supports 1 IR objective and 1 visual objectives. Typically, you will use a 15x IR objective and a 4x visual objective. The microscope also supports optional 32x IR objective and 10x or 40x visual objectives.
C	**Motorized stage**	The stage supports a 40 mm working distance and samples up to 5 kg. Control the stage through OMNIC Paradigm software or with the optional joystick. Never attempt to move the stage by hand.
D	**Transmission illumination iris**	Use the field of view iris to adjust the size of the illuminated field of view. It opens and closes concentrically. Typically, the iris is fully opened so that it is out of the full field of view. If a sample surface is uneven, you may find it easier to focus on the edges of the iris blades to find the best focus.
E	**Power indicator and button**	Press to turn the microscope on or off. The blue power indicator blinks while the microscope is starting up and stays a steady blue when the microscope is ready for use.

F	**Reflection Illumination iris**	Use the field of view iris to adjust the size of the illuminated field of view. It opens and closes concentrically with respect to the reticle cross hairs. Typically, the iris is fully opened so that it is out of the full field of view. If a sample surface is uneven, you may find it easier to focus on the area of interest if you first partially close the iris and focus on the edges of the iris blades.
G	**1-Liter Liquid Nitrogen Dewar**	The liquid nitrogen dewar holds 1 liter of liquid nitrogen. Once cooled, the detector will remain cool for about 18 hours. See "Cooling the detector" for more information.

Figure 2-2: Close up of the stage

A	**ATR sensor**	The ATR sensor detects whether the slide-in ATR attachment is installed.
B	**Sample slide alignment indicator**	Align the red indicator dots on the stage and the sample slide.
C	**Control stage orientation**	Used to rotate the stage during installation. Do not adjust after installation.
D	**Slide-in ATR attachment**	The optional slide-in ATR attachment is used for ATR measurements.

2.2 Connections and ports



A	USB 3.0 connection to computer's USB 3.0 port
B	Connection to the optional joystick
C	Connect to Auxiliary Signals port on the spectrometer
D	Connect to "Accessory" port on the spectrometer
E	Connection to power supply cable

2.3 Optional Joystick

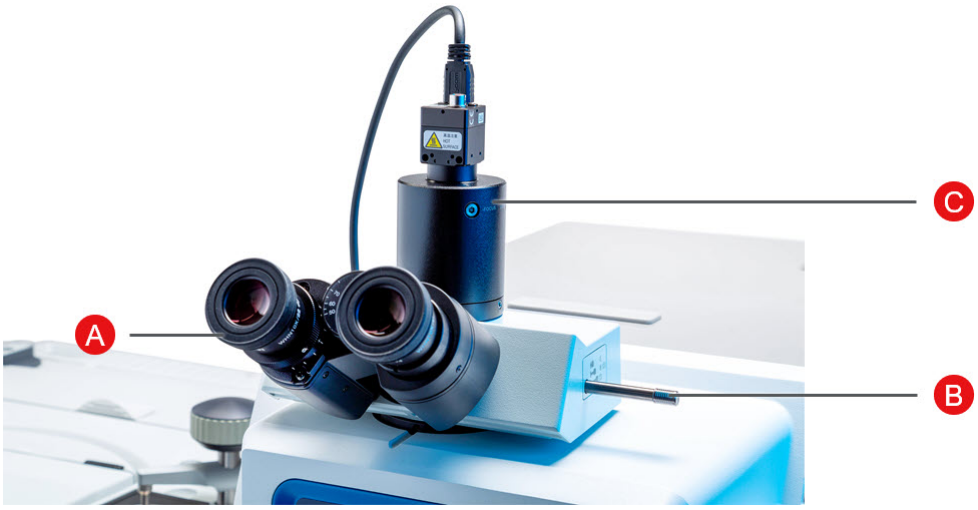
You can use the optional joystick to control the stage position and sample illumination. The stage and illumination can also be controlled in the software.

To connect the joystick, plug the data cable into the "Joystick" port on the back of the microscope.

A	**Transmittance illumination control**	Rotate to manually dim or brighten transmittance illumination.
B	**Reflectance illumination control**	Rotate to manually dim or brighten reflectance illumination.
C	**Joystick for stage control**	Push the joystick forward, backward, left, or right to move the stage along the sample plane. Rotate to move the stage up or down.
D	**Speed control**	Controls the speed of the stage for precise, slow movement or fast movement.

2.4 Optional trinocular eyepiece

Your microscope may have either a monocular eyepiece with only the camera or it may have the trinocular eyepiece with the camera and visual eyepieces.



A	**Visual eyepieces**	Adjustable eyepieces for looking at the sample. Best used with the optional joystick.
B	**Three-position view selector**	Controls the light path for the eyepieces. • **In:** Eyepiece only, no camera • **Middle:** Eyepiece and camera • **Out:** Camera only, no eyepieces
C	**Camera**	The USB camera is operated with OMNIC Paradigm software.

2.5 Using OMNIC Paradigm software

Run your microscope and analyze your samples using OMNIC Paradigm software, Thermo Scientific's streamlined material analysis software. The user-friendly dashboard screen helps you view instrument status and recent work, process your spectra, conduct multi-component searching, and create new libraries. Designed with lab managers and science educators in mind, this software helps automate workflows using an intuitive drag-and-drop workflow creator. Work remotely and collaborate with colleagues around the globe when you upload OMNIC Paradigm data to the cloud using the Thermo Scientific OMNIC Anywhere Application.

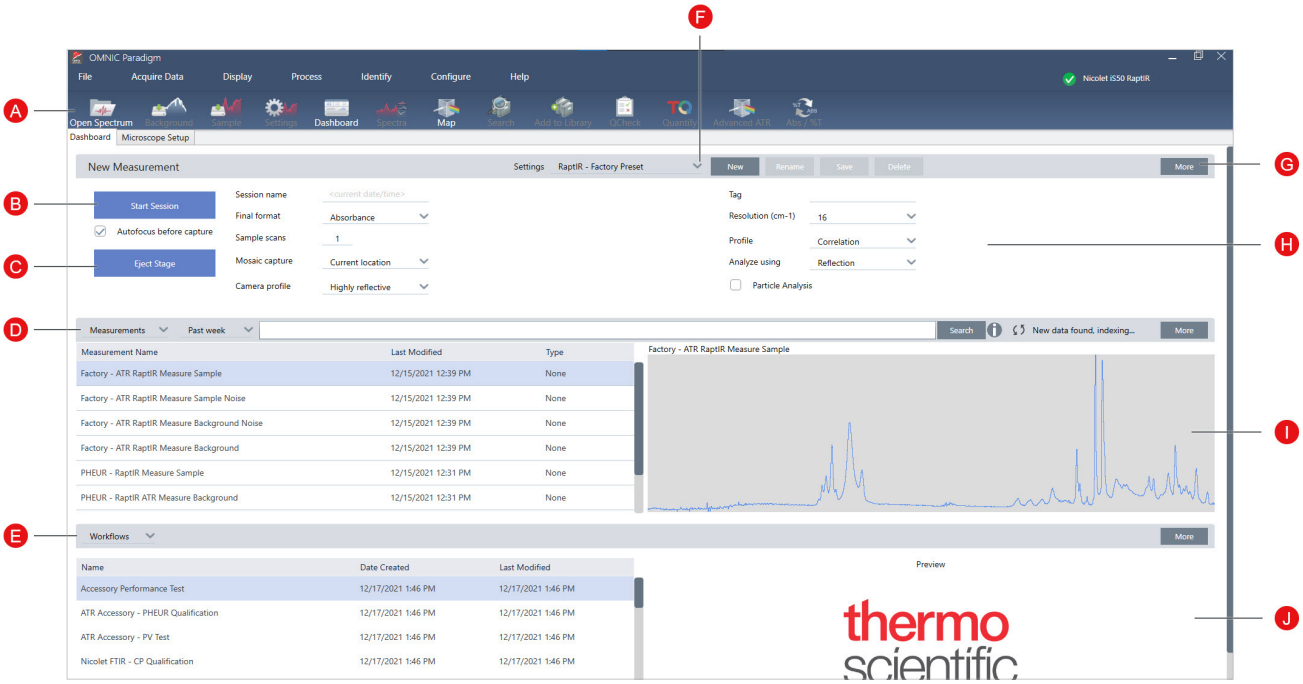
2.5.1 Interface

When working in microscopy, you will primarily work in the dashboard and the map views.

The dashboard

Begin a new session, edit measurement settings, view recent measurements, reports, and maps, and view workflows on the dashboard.

Figure 2-1: The dashboard showing tools for microscopy



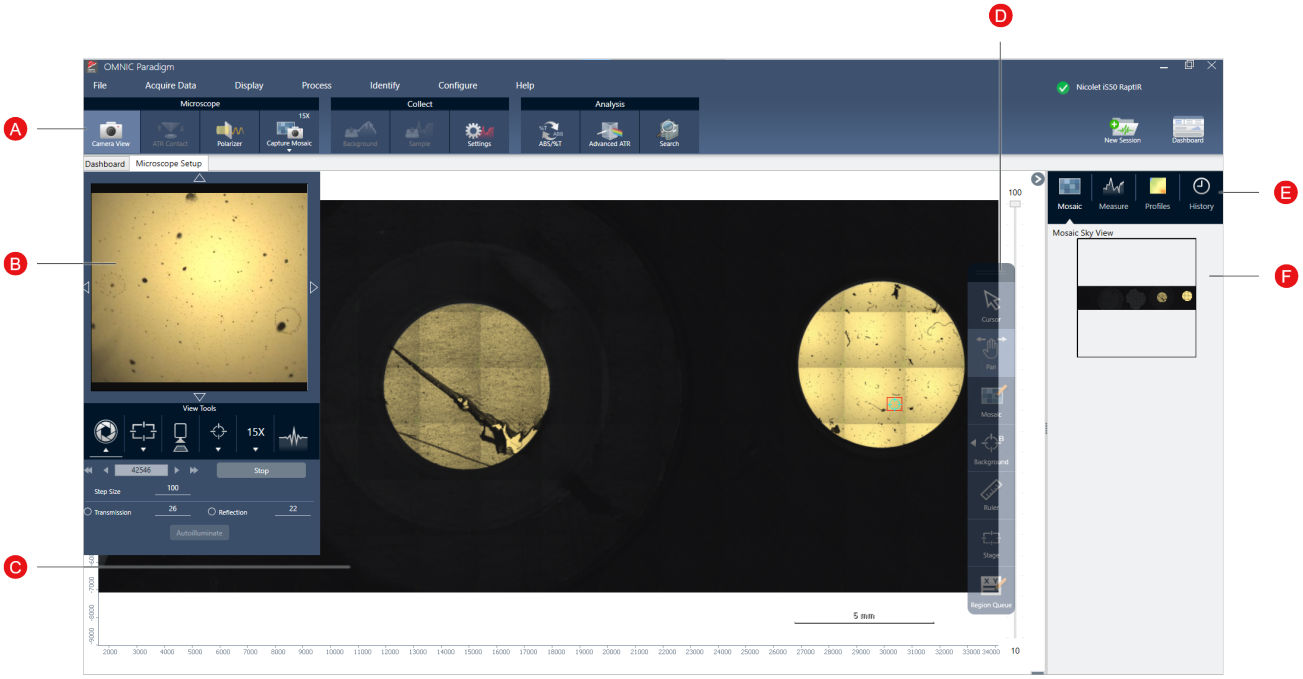
A	**Toolbar**	The toolbar includes buttons for features and tools you will need use often and is used to navigate between the Dashboard, Map, and Spectral views.

B	**Start Session**	After you've loaded your sample and selected a mosaic capture location, click **Start Session** to switch to the Map view and to automatically collect a mosaic image of the sample. Select **Auto-focus before capture** to automatically bring the sample into the best focus.
C	**Eject Stage**	Ejecting the stage is optional. Ejecting lowers the stage and moves it forward so that you have more room to load your sample. After the sample is loaded, click Start Session to move the stage back into position.
D	**Measurements, Maps, and Reports**	Displays your Measurements, Maps, and Reports. Choose a category from the list to switch views.
E	**Workflows and Packages**	Displays qualification and performance verification workflows as well as your custom workflows. For more on creating and using workflows, see OMNIC Paradigm software guides and tutorials.
F	**Settings**	Create, select, save, or delete collections of settings.
G	**More**	Click More to expand any of the main sections of the dashboard and to view additional settings or details.
H	**Collection settings**	The most commonly used settings are shown here, in the New Measurement pane. Click More to view additional advanced settings, including settings for background measurements.
I	**Preview**	Shows a preview image of the selected measurement, map, or report.
J	**Workflow or package preview**	Shows a preview image of the selected workflow or package. Locked workflows display a logo instead of the preview of the workflow.

The map view

Analyze your sample using the map view. Here you can view your sample, define areas of interest for your analysis, and measure sample data.

Figure 2-2: The map view in OMNIC Paradigm software



A	**Toolbar**	View additional microscope settings and open the live camera view, capture a new mosaic, measure a spectrum, or navigate back to the dashboard.
B	**Camera view**	Open the camera view to see the live visual image of the sample. Use the View Tools to adjust the illumination, focus, and aperture and to take a quick, snapshot mosaic, change objectives, or view a live interferogram signal. Use the arrows around the live image to move the stage without a joystick.
C	**Mosaic view**	Shows the mosaic image and is the primary workspace where you define your background point and areas for analysis.

D	**Floating toolbar**	Analysis and navigation tools for interacting with the mosaic image.
		• Cursor: select regions, points, and spectra
		• Pan: Use to move the viewable portion of the mosaic
		• Mosaic: Use to draw a region for a high-magnification mosaic
		• Analysis tools
		  • Background point: Select a point at which you will measure the background spectrum
		  • Area: Draw an area for region analysis
		  • Point: Select a point to measure a spectrum
		  • Line: Measure a line map
		  • Particle analysis: Draw a region for particle analysis. This tool is only available when particle analysis is selected on the dashboard.
		• Ruler: Use the ruler to measure objects in the mosaic view
		• Stage: Click a point on the mosaic to move the stage to that position
		• Region queue: View all of the regions and points that are currently selected for your analysis. These are the positions that will be measured when you click Sample.

E	**Analysis panel**	View your mosaics, background spectra, profiles, and history in the analysis panel.
F	**Mosaic sky view**	The sky view shows a high-level view of the mosaic. When you zoom in, the sky view shows you what part of the mosaic you are viewing. You can use the sky view to navigate around the whole mosaic.

3. Operation

3.1 Prepare the microscope

To start your analysis, prepare the microscope by turning it on, cooling the detector, and starting OMNIC Paradigm software.

3.1.1 Turn the microscope on

If the microscope is off, press the power button. The blue indicator light blinks during initialization and shows a continuous blue glow when the microscope is ready to use.

3.1.2 Cool the detector

Your microscope uses a liquid nitrogen cooled detector. Before using the microscope, always ensure there is enough liquid nitrogen in the dewar.

The liquid nitrogen dewar holds 1 liter of liquid nitrogen. When cooled according to the following procedure, the detector should remain cool for approximately 18 hours.

WARNING

Avoid freeze burns.

Liquid nitrogen is extremely cold and therefore hazardous.

- Wear protective clothing and eyewear and follow standard laboratory safety practices to prevent injury.
- Pour the liquid nitrogen slowly. If you pour too quickly, the nitrogen may splash.

❖ **To refill the liquid nitrogen dewar**

1. Open the dewar cover and remove the plastic stopper from the dewar.
2. Insert the funnel into the detector dewar, and pour the liquid nitrogen slowly into the funnel. (A small amount of liquid nitrogen typically spills out of the funnel. This will not harm your instrument.) Then let the liquid nitrogen drain completely two or three times. Wait until the vapor plume disappears and then repeat until the dewar is filled. Continue to slowly fill the funnel until 1.0 liters of liquid nitrogen is consumed or until nitrogen bubbles under the funnel. Stop filling at this point.
3. Remove the funnel.
4. Wait until the vapor plume disappears, and wait 5 minutes before closing the dewar cover to allow the gasket to thaw.
5. Wait 20 minutes, then repeat the procedure to make sure the dewar is filled.

3.1.3 Start OMNIC Paradigm software

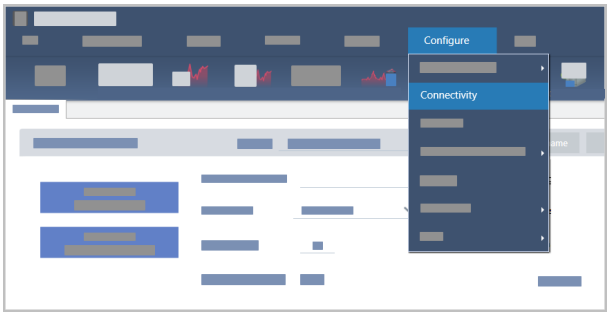
Use OMNIC Paradigm software to control the microscope and analyze your sample.

When you first start the software and first turn on the microscope, the software checks the limits of the stage movement to ensure that everything is operating correctly.

❖ **To start OMNIC Paradigm software and connect to the microscope**

1. Start OMNIC Paradigm software.
2. If the software is connected to the microscope already, the instrument status displays Nicolet iS50 RaptIR and a green check mark. .

3. If the software is not already connected to the instrument, connect now.
   a. Go to **Configure > Connectivity** and select the spectrometer. Click **Connect**.



b. To switch to the microscopy view, go to **Configure > Sample Location > RaptIR**. The dashboard changes to show microscopy tools. To switch back to spectroscopy tools, change the sample location back to another accessory or module on your main spectrometer.

3.2 Analyze samples

Use OMNIC Paradigm software to operate the microscope and to analyze samples. Typically, you will analyze your sample by following these steps:

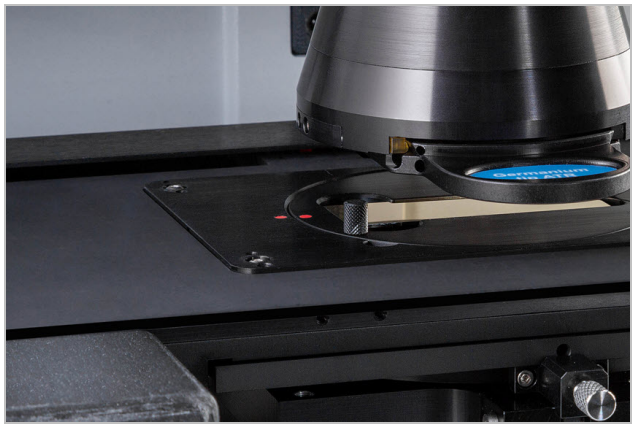
- Prepare and load the sample.
- Capture a visual image of the sample surface. This image is called a mosaic.
- Collect a background spectrum.
- Analyze the sample.

3.2.1 Load a sample

Eject the stage so that you have more access to the stage to position your sample. If your sample is small and fits in position easily, you can position the sample without ejecting the stage.

❖ To insert a sample

1. In the software, click **Eject Stage**. Ejecting the stages lowers the stage and moves it out to make it easier for you to load a sample.
2. Insert the sample slide. The stage fits a universal sample holder. Use the red indicators to properly orient the sample holder.

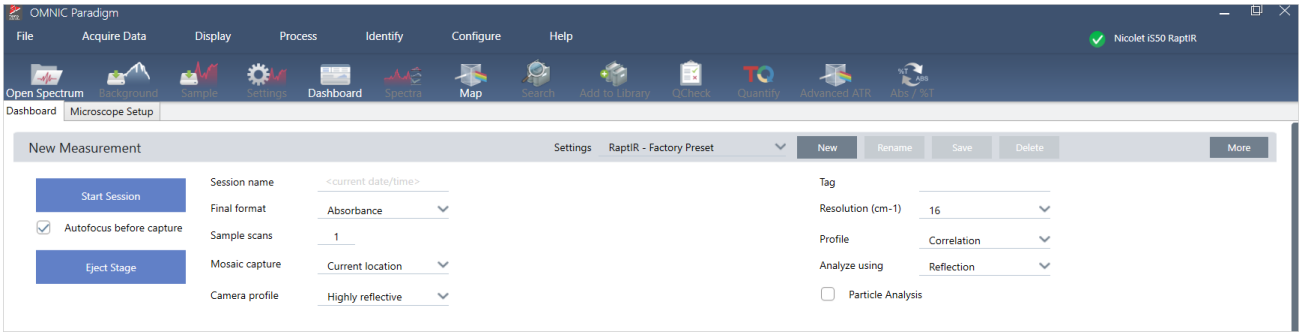


When your sample is installed, you are ready to begin the session and collect a mosaic. If you ejected the stage, the stage will move back into position automatically when you begin the session. You can leave the stage ejected until you start the session.

3.2.2 Prepare your measurement settings

When your sample is in place, review your measurement settings on the Dashboard. The most commonly used settings are shown at the top and you can view additional, advanced settings if you click the More button.

For more on each of the measurement settings, see the OMNIC Paradigm software User Guide.



Note Select **Particle Analysis** to analyze groups of small particles. With this option selected, the particle analysis tools will be present in the map view. Clear this Particle Analysis selection to instead analyze areas, lines, and individual sampling points.

3.2.3 Capture a mosaic

When your sample is in position, capture a mosaic. A mosaic is a visual image of your sample surface. The camera captures a series of small, high-resolution images and stitches them together into a single mosaic, giving you a large image of the sample surface that you can use for your analysis. The mosaic acts as a workspace for your analysis, where you can explore regions of interest and specify areas and points for your IR data collection.

In general, when you are analyzing a sample, you will collect a low-magnification mosaic image with a 4x or 10x magnification objective, adjust your settings as needed, then if needed, capture a high-magnification mosaic of a smaller area using the 15x or 30x objective. When you have captured a mosaic, draw regions or select particles, and begin measuring data.

Capturing a mosaic requires you to review your collection settings, choose a location for the mosaic capture, and click Start Session.

◆ To capture a mosaic

1. On the dashboard, select **Autofocus before capture** and review your session settings. With this option selected, the software automatically brings the sample into focus. Clear the selection to focus manually instead.
2. Select a location from the **Mosaic Capture** list. This tells the software where to find your sample and where to capture the mosaic. To start the session without automatically collecting a mosaic, select **Do not capture mosaic**.
3. Click **Start Session**. The stage moves your sample into position and the software collects a low-magnification mosaic. The software switches to the Map view and displays the mosaic in the main panel.

If you selected "Do not capture mosaic" from the Mosaic capture list, the software switches to the Map view without capturing a mosaic.

3.2.4 Measure a background spectrum

Before you collect sample data, measure a background spectrum.

❖ To measure a background spectrum

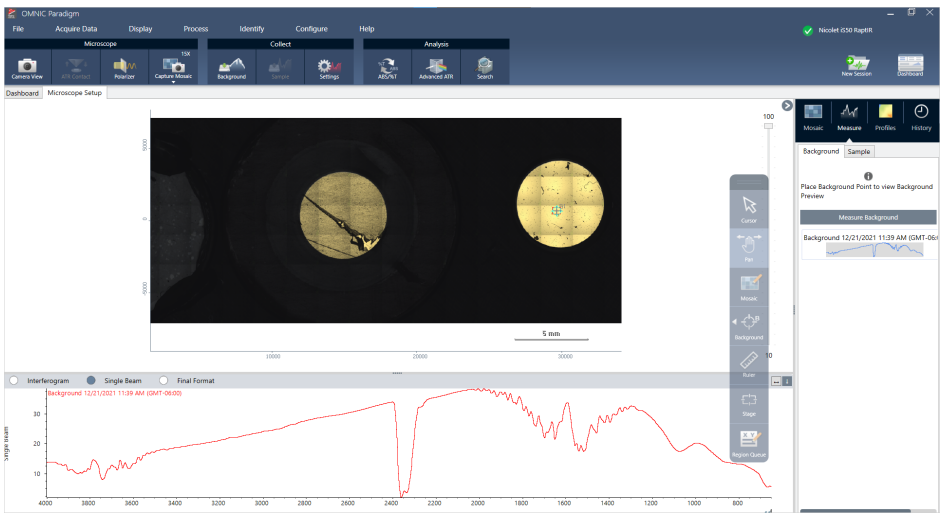
1. From the floating toolbar, select the **Background** tool.

2. Click the mosaic at the point where you want to measure the background. A live Single Beam spectrum is displayed in the spectra pane. Use this spectrum to determine if you want to use this point for your background measurement. Click the mosaic again to move the background point.

   For more on choosing the best background point for your sample, see"Analyze samples"

3. When you are satisfied with the background point, click **Accept Background**. This is the opportunity to select a better background location before measuring the data.

4. Click **Measure Background.** The background spectrum is collected. When it is complete, it is added to the Background tab of the Spectra tab.



If you are measuring multiple areas over a period of time, replace your background measurement periodically. In general, you should always have a recent measurement of the background before your measure the sample.

3.2.5 Analyze areas, lines, and points

Create a chemical image of an area of the sample surface by specifying one or more regions to analyze. You can also measure the sample at individual points using the point tool, or measure along a line with the line tool.. You can measure areas, lines, and points together.

Measuring areas, points, and lines requires you to first capture a mosaic and measure the background.

◆ To analyze areas, lines, and points

1. "Capture a mosaic"
2. "Measure a background spectrum".
3. Specify areas, lines, and points to analyze. You can add multiple areas and points to a single analysis.

To analyze	Select this tool	Perform these steps
Areas		1. Select the area tool. 2. Click and drag on the mosaic to draw the area.
Lines		1. Select the line tool. 2. Click and drag to draw a line.
Points		1. Select the point tool. 2. Click to add a point.

   Use the cursor tool to select or delete areas, lines and points.

4. When you are finished adding regions and points, click **Sample**.

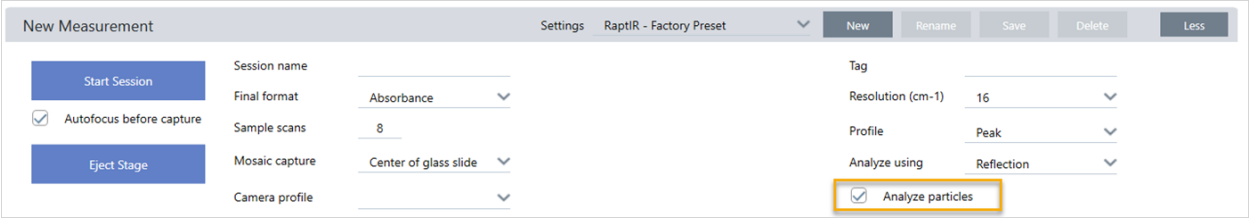
When the measurement is complete, view the results in the new tab. See "Next steps" for more on analyzing and sharing your results.

3.2.6 Analyze particles

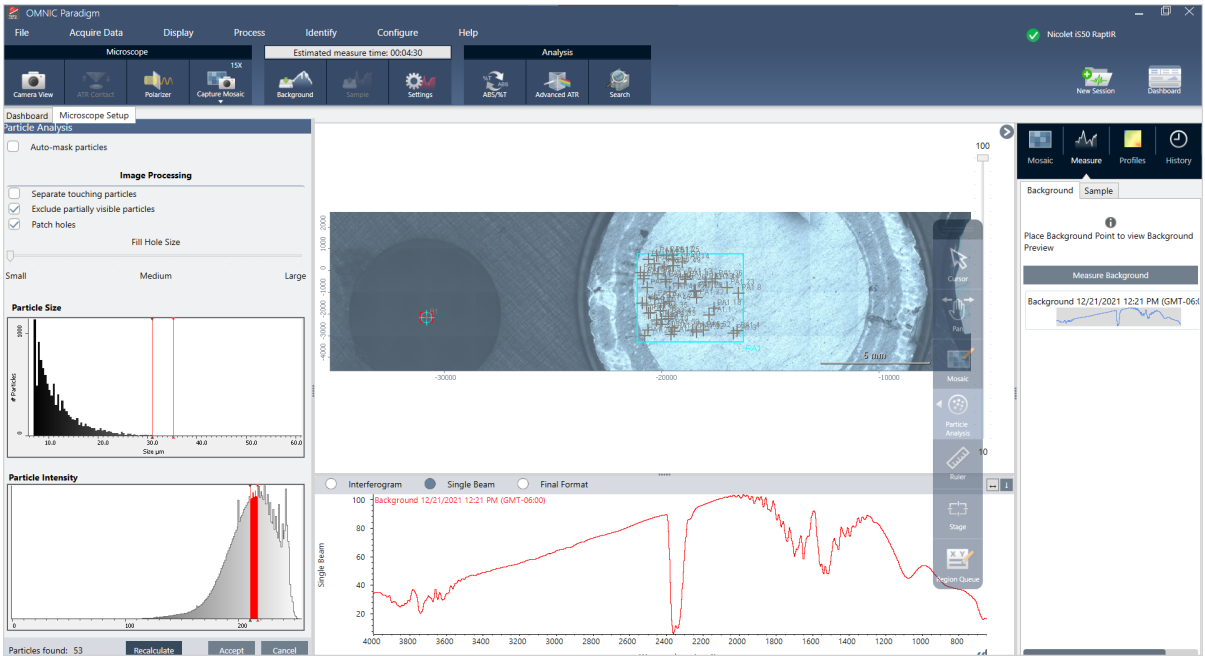
Use the Particle Analysis tools to locate, characterize, and identify particles.

◆ To analyze particles

1. Prepare your sample
2. On the dashboard, select **Analyze particles.**



3. "Capture a mosaic"
4. In the map view, review the mosaic and make any needed changes to focus and illumination. Capture a high-magnification mosaic if needed.
5. "Measure a background spectrum"
6. Analyze particles.
   a. Select the Particle Analysis tool , and click and drag to draw a rectangle on the mosaic. This is the region of interest, where the software will detect particles. When you have drawn a region, the Particle Analysis pane opens.



   b. Refine your selection using the options and selection tools. Select **Recalculate** after updating settings to update the particles. See the OMNIC Paradigm guides and tutorials for detailed explanations of the particle analysis tools and settings.

c. When you are satisfied with your selection, click **Accept**. This saves the selection settings but does not yet measure the data.

d. Click **Sample**.

9. When the measurement is complete, view the results in the new tab. See "Next steps" for more on analyzing and sharing your results.

3.2.7 Next steps

- Apply profiles to visualize properties of the sample data
- Apply processing to selected spectra
- Create reports or export data
- Explore spectra further in the Spectra view.

3.3 ATR measurements

With the optional slide-on attenuated total reflection (ATR) attachment, you can analyze highly infrared-absorbant or hard-to-prepare microscopic materials, often with little or no sample preparation. Examples of these materials include polymers, coatings, rubbers, coated papers, and biological materials.

Applications of ATR microscopy include:

- Analyzing the surface of a sample
- Analyzing highly-absorbing materials and the surfaces of thick samples
- Analyzing surface coatings
- Analyzing surface defects, inclusions, or degradation

3.3.1 Installing a slide-on ATR attachment

The slide-on ATR attachment fits into the 15x objective and has two positions:

- Slide half-way / first stopping point to see through. Use with camera mode to view the sample.
- Slide all the way to second stopping point for ATR.

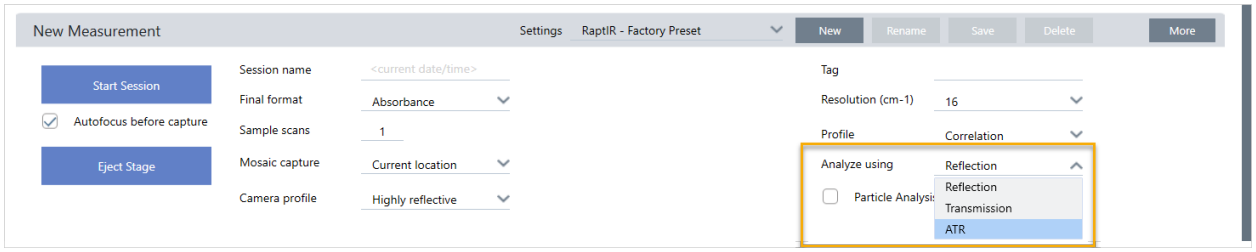
A sensor on the microscope detects when the ATR attachment is installed, and the software prompts you to install or remove it as needed.

3.3.2 Measure using ATR

To use the ATR crystal attachment for your measurement, you will install the crystal attachment, prepare your measurement settings, and measure the sample.

❖ To measure using ATR

1. On the dashboard, select **ATR** from the Analyze Using list.



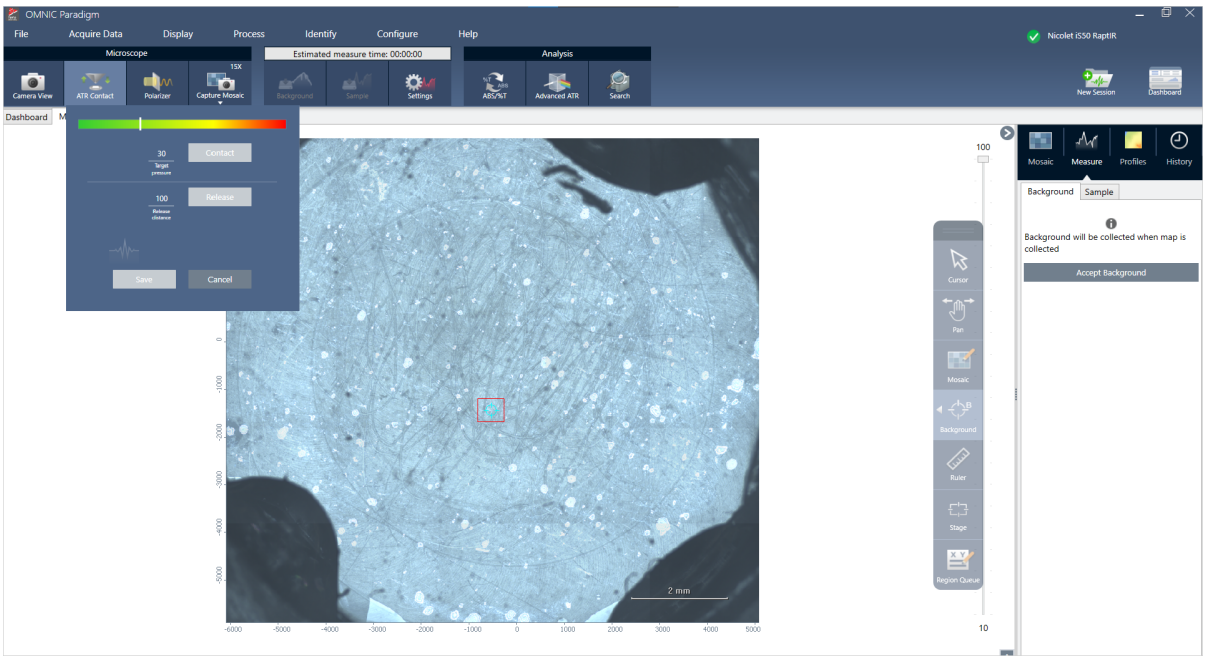
2. "Capture a mosaic".

   Once you have captured a mosaic, you can measure the background with the crystal installed and measure you sample using the area or points tools, just like a standard reflection measurement. In general, the default ATR Contact

settings are sufficient. However, you want to view or change the contact settings, open the ATR Contact view before measuring the background or sample.

3. Optional: Review and edit the ATR Contact settings.

   a. In the Map view, click **ATR Contact** to view the ATR settings.



Setting	Description
Target pressure	This is the target pressure that will be applied during measurement. Click and drag the slider or enter an exact value.
Release distance	The vertical distance that the stage moves once the ATR contact is released. A larger distance provides more clearance but will cause the ATR measurement to take longer, since the stage will move farther at every point.
Press Contact to test the contact pressure **Press Release to release contact.**	

4. "Analyze areas, lines, and points" or "Analyze particles". The software prompts you to insert or remove the ATR crystal attachment as needed.

3.4 Locate, light, and mask the sample

To manually optimize your mosaic image and your IR data, use the Camera View to find the region of interest, bring the sample into focus, adjust the illumination, and change the aperture.

3.4.1 Move the stage and bring the sample into focus

The easiest way to bring the sample into focus is to select an approximate location of interest from the Mosaic capture list and to select the Autofocus before capture option. With these options selected, when you start the session, the stage will automatically move to the correct location, bring the sample into focus, and capture a mosaic.

If you want to move to another location and bring a new region into focus, you can move the stage and bring the sample into focus using either the software or the optional joystick.

Move the stage using either OMNIC Paradigm software or the optional joystick. Never attempt to move the stage by hand.

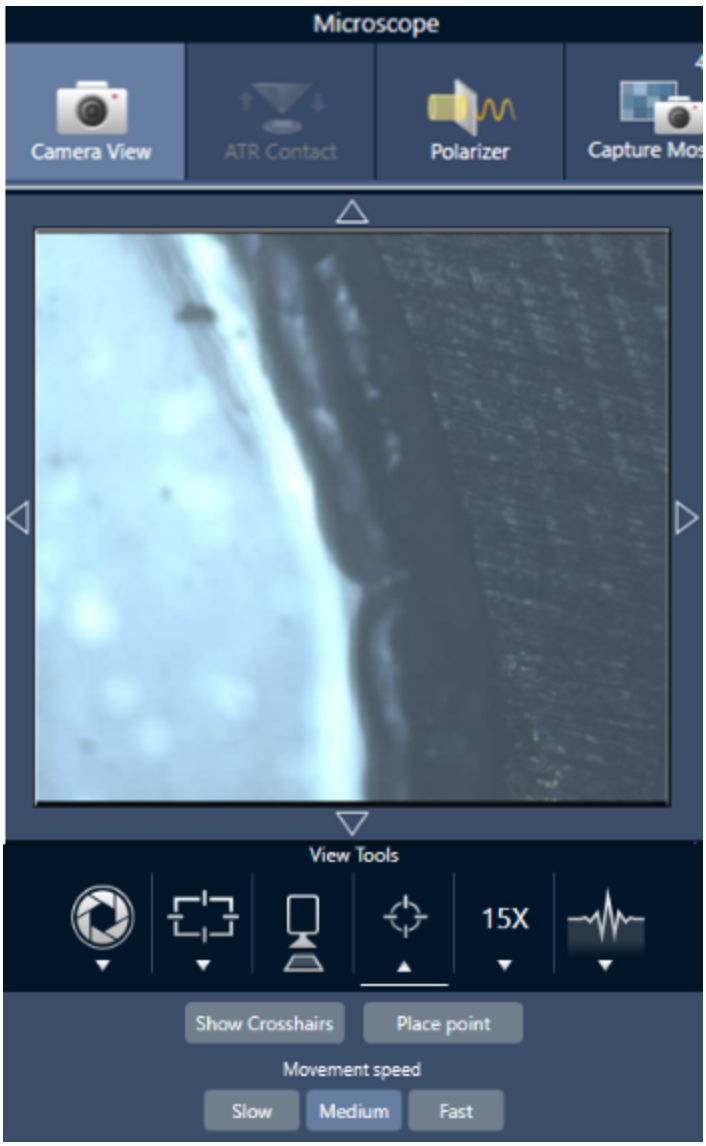
WITH THE SOFTWARE

In the map view, open the Camera View to see the sample.

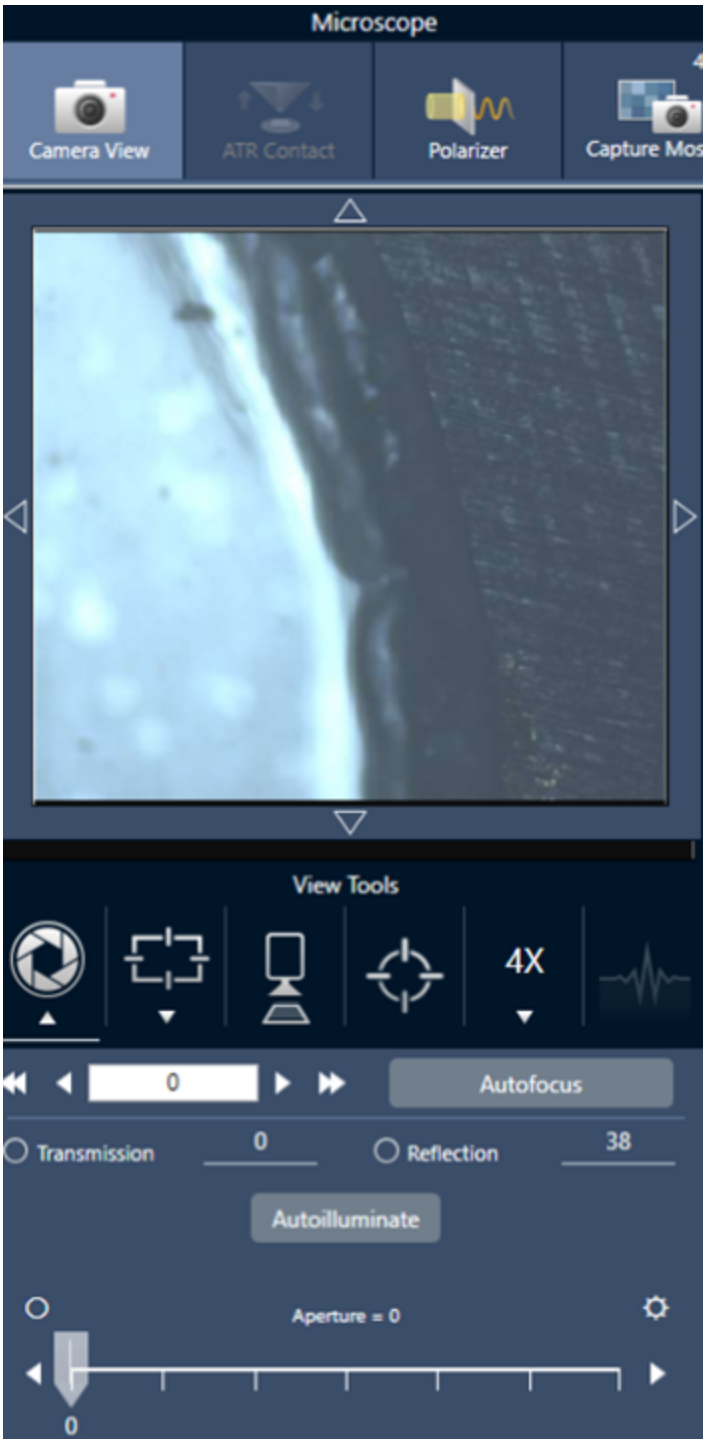
- **To move the stage horizontally,** open the Camera View and open the Stage tools.

  Click the arrows to the sides and above and below the sample image to move the stage. Change the movement speed to change how far the stage moves with each click.

Double-click inside the live video image to center the stage on that position.



- **To move the stage up and down,** open the Camera View and open the focus settings. Click the left and right arrows to move the stage up or down.



Autofocus

To bring the sample into focus automatically, click Autofocus. The software moves the stage and up down to find the optimal focus. Autofocus works best with areas of high visual contrast. Autofocus may struggle with some low-contrast samples and samples with multiple focal planes.

Tips for autofocus

- Adjust the illumination for optimal viewing. If the illumination is too high or too low, there may not be enough contrast for autofocus to find the proper focus.

WITH THE JOYSTICK

You can move the stage horizontally or vertically with the joystick, and with the movement speed control, you can move quickly or carefully. Use the Camera View or the optional eyepieces to judge your position.

- **To move the stage horizontally,** push or pull the joystick forward, backward, left, and right.
- **To move the stage up or down,** rotate the joystick clockwise to move the stage up or counterclockwise to move the stage down.

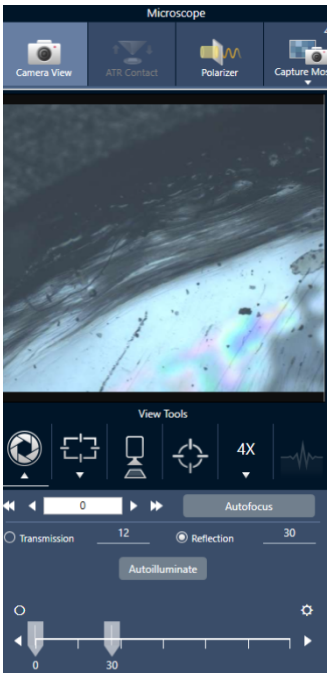
Use the speed selector to change movement speeds.

3.4.1 Illuminate the sample

You can control the amount of light that reaches the sample by using either the software or the optional joystick. Use the reflection illumination controls to set the light from above the sample and the transmission illumination controls to set the light from below the sample.

With the software

To control the illumination in the software, open the Camera View. Select either Transmission or Reflection and drag the slider to the desired light setting. You can also enter an exact value.



Autoilluminate

Click Autoilluminate for the software to automatically optimize the sample illumination.

With the optional joystick

The optional joystick has two control knobs to set the transmission and reflection illumination. Use the Camera View or the optional eyepieces to view the sample illumination. Rotate the knobs to control the light.

3.4.1 Adjust aperture

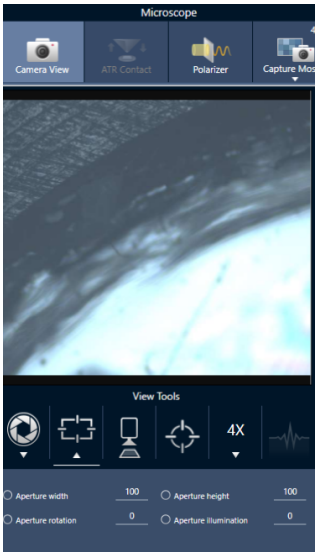
The adjustable aperture defines the area that the IR beam interacts with the sample. This ensures that IR energy strikes only the area of interest and not the adjacent sample material, and it ensures that the small amount of diffracted radiation that passes around the edge of the area of interest does not reach the detector.

During particle analysis, the software finds a set of ideal apertures for all of the particles, and then uses those apertures during the sample measurement.

Set the aperture manually in the Advanced settings area of the dashboard or in the Camera view.

❖ **To adjust the size, shape, and rotation of the aperture**

1. Open the Camera view and select the aperture settings.



2. Use the sliders or enter an exact value to adjust the height, width, and rotation of the aperture.

Note To visualize the aperture, adjust the illumination until you can see the bright blue rectangle of light passing through the aperture.

3.5 Verify microscope performance

Ensure that your microscope is working well by running PV workflows and checking the system status.

3.5.1 Performance verification and qualification workflows

Check the performance of your microscope by running the qualification or performance verification (PV) workflows. These workflows use an established standard sample to check performance of the instrument. Each test follows different regulatory standards.

PV and qualification workflows use the polystyrene standards plate to test the microscope's performance.

Table 3-1: Descriptions of qualification and performance verification workflows

Test	Description
Nicolet RaptIR - Factory Qualification	Runs factory recommended tests and all qualification tests.
Nicolet RaptIR - Factory ATR Qualification	Runs factory recommended tests and all qualification tests using the ATR accessory.
Nicolet RaptIR - PV Test	Measures the basic performance of the RaptIR based on factory recommended tests.
Nicolet RaptIR - PV ATR Test	Using ATR, measures the basic performance of the RaptIR based on factory recommended.
Nicolet RaptIR - PHEUR Qualification	Executes the qualification tests for the RaptIR as defined in the European Pharmacopoeia.
Nicolet RaptIR - PHEUR ATR Qualification	Executes the qualification tests for the ATR accessory on the RaptIR as defined in the European Pharmacopoeia.
Nicolet RaptIR - USP Qualification	Executes the qualification tests for the RaptIR as defined in the US Pharmacopoeia.
Nicolet RaptIR - JP Qualification	Executes the qualification tests for the RaptIR as defined in the Japanese Pharmacopoeia.
Nicolet RaptIR - CP Qualification	Executes the qualification tests for the RaptIR as defined in the Chinese Pharmacopoeia.

❖ To run a qualification or performance verification workflow

1. Right-click the workflow and select **Run.**
2. Follow the on-screen prompts.

When the workflow is complete, the final reports are added to the Reports pane in the dashboard and can be printed.

3.5.2 System Status

The system status icon displays information about your instrument and software services.

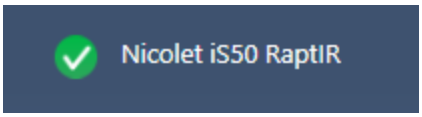


Table 3-2: System status icons

Icon	Icon with Security Suite installed	Description
		The system is connected and all services are running correctly. You are ready to measure and save data. Click the system status icon to view details about the system.
		A yellow icon means there may be a problem with the instrument, such as the following: • The detector is warm • The instrument is not scanning • The instrument is not connected Click the system status icon for more details about the problem. Also visually inspect the instrument and connection.
		There is a problem with one or more software services. Click the system status icon for details. If the service does not start automatically after a few minutes, restart the computer.

If you continue to have trouble with system status errors, contact customer support.

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4. Maintenance

4.1 Clean the microscope

If you wish to remove dust from a mirror, window, or optical component, blow it off with the dust blower that was included with the microscope. Do not use canned air or duster, which may damage the instrument. Never allow any liquid to come into contact with a window or optical component.

4.2 Maintain the liquid nitrogen dewar

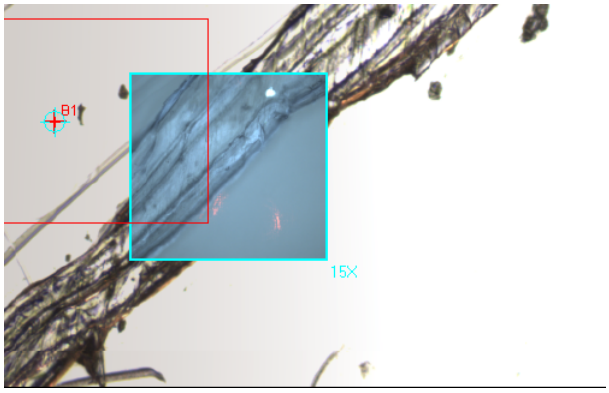
The MCT detector dewar should maintain its insulating vacuum for several years. If the vacuum leaks, the insulation will lose effectiveness and the following symptoms may occur:

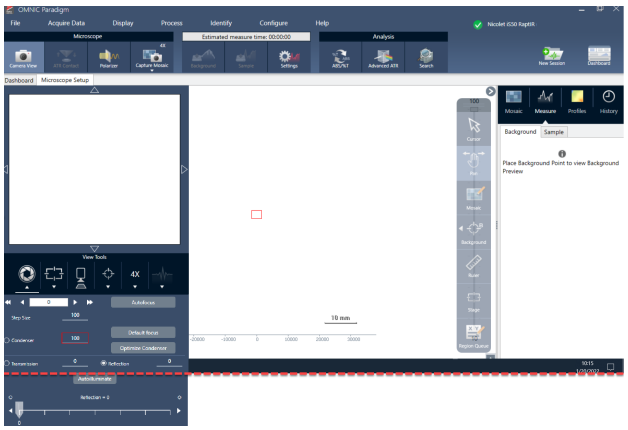
- Liquid nitrogen boils off much faster than usual
- Water and atmospheric contaminants condensing on the detector window will show up in spectra as unwanted peaks

NOTICE

If your instrument shows any of these symptoms, the detector dewar may have a vacuum leak. Contact us immediately for assistance.

5. Troubleshooting

Problem	Possible cause	Solution
15x mosaics do not reproducibly align with the 4x image. For example, in the image below, the 15x image is not aligned with the 4x image. 	The objective is loose	The objective can sometimes become loose. This usually happens when inserting and removing the ATR attachment. If the objective feels loose, hand tighten the objective. The slot for the ATR attachment should face directly to the front. Do not over tighten the objective, and do not use the ATR attachment as a lever to tighten the objective. Over tightening the objective will damage it. If the objective feels snug and you are still having alignment issues, contact your service representative.

Problem	Possible cause	Solution
Sections of the software interface do not fit on the screen. 	Your display scaling settings are not compatible with the software	If parts of the software interface do not fit on the screen, you may need to adjust your display scaling in your device's display settings. For example, on some monitors, the Camera tools may not fit on the screen if the display scaling is set to above 100%. For help changing your display settings, see Windows help information.
The mosaic or camera view are completely black.	The camera is not connected.	Verify that the camera cable is plugged into the nosepiece. Verify that the microscope USB cable is plugged into the USB 3.0 connector.
The system status shows a yellow or red icon.	There may be a problem with the instrument or with software services.	See "System Status"for more information.

6. Contacting us

For Technical Support, please contact: www.thermofisher.com

6.1 Ordering parts

To order parts, contact us.

If you need to send the instrument or an accessory to us for repair, call or e-mail us first for any shipping requirements or other instructions.