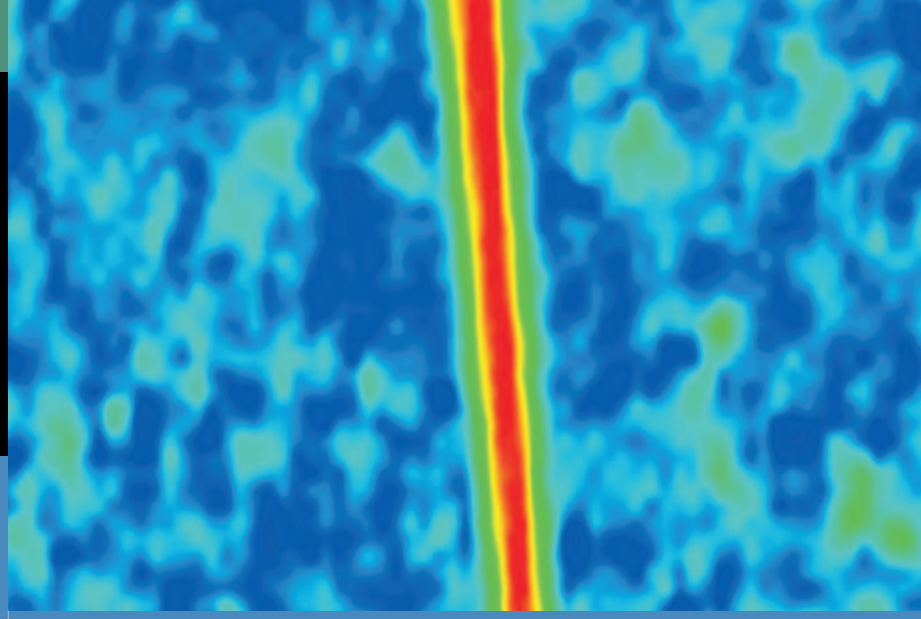
# Thermo Scientific Nicolet iN10 MX FT-IR Microscope



## *Infrared Imaging Microscope*

iNtuitive

iNnovative

iNtegrated

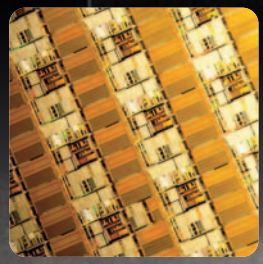
# Thermo Scientific Nicolet iN10 MX FT-IR Microscope

*You don't need to be an infrared imaging spectroscopist to get the answers from your Nicolet iN10 MX microscope.*

**Polymers**

**Paints**

**Packaging**



**Microelectronics**

**Inks & Pigments**

# *Infrared Chemical Imaging Redefined*

For investigative researchers in analytical laboratories who need to quickly analyze large sample areas to extract chemical and physical information, the Thermo Scientific Nicolet™ iN™10 MX is an integrated infrared imaging microscope engineered specifically for chemical imaging analysis. Unlike other IR imaging systems, the Nicolet iN10 MX delivers complete sample information, including compound distributions and physical properties from materials in complex matrices, while providing the speed, sensitivity and resolution of traditional infrared microscopy.

- The Nicolet iN10 MX is the only infrared imaging microscope with FT-IR optics contained within the system. These optics have been designed for optimal microscopy analysis performance.
- We have developed the Nicolet iN10 MX infrared microscope for analysts, technicians and chemists who know exactly what information they need, but do not have time to become a microscopist or a spectroscopist. Let OMNIC™ Picta™ software extract chemical images, size of sample features and relative distribution in percentage.
- The exceptional sensitivity Nicolet iN10 MX microscope permits point and shoot samples down to 50 microns with no need for liquid nitrogen cooling.
- The microscope's patent pending illumination uniformity and zoom optics deliver the highest quality infrared images and spatial resolution.
- The Nicolet iN10 MX takes you beyond diffraction limits with its micro-ATR. The sampling accessory can detect even the smallest features of your sample, down to 3 microns.
- The Nicolet iN10 MX enables you to acquire maps with the standard detector considerably faster than other mapping systems – approximately 4.5 minutes for a 1.2 x 1.2 mm area (at the same spatial resolution of spectral imaging). You can also upgrade to an imaging detector to scan the same area in just 20 seconds.
- For analysts and chemists who require only infrared microanalysis and chemical imaging, there is no reason to acquire a FT-IR spectrometer system. If you need to analyze both bulk and micro samples, the Nicolet iZ™10 FT-IR module gives you full spectrometer capabilities with minimal investment.

***The ideal instrument for analytical services, materials science, research, and academia***

Polymers, rubbers, packaging, paints, coatings, compounding, microelectronics, pharmaceuticals, cement, cosmetics, textiles, fibers, pigments, paper chemicals, inks and adhesives are only a few of the materials that can be investigated by using the Nicolet iN10 MX FT-IR microscope.

Inspired by your recommendations, the Nicolet iN10 MX redefines what an infrared imaging microscope is and how you use it.

**Fibers**

**Pharmaceuticals**

**Cement**

**Rubbers**

**Cosmetics**

*These are only a few of the materials which can be investigated by using the Thermo Scientific Nicolet iN10 MX FT-IR microscope.*

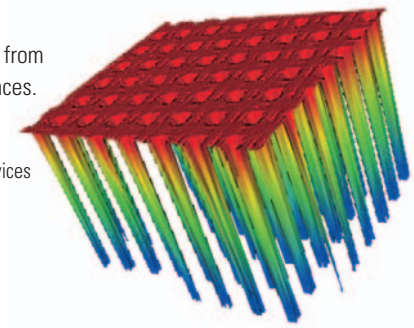
# *Imaging Power for Every Sample*


## New Features for Data Collection

The long working distance of the Nicolet iN10 MX lets you collect data from materials recessed into the sample or from materials with uneven surfaces.

The 16-mm working distance gains access to:

- Recessed areas such as circuit boards
- Uneven sample surfaces
- Micro well plates



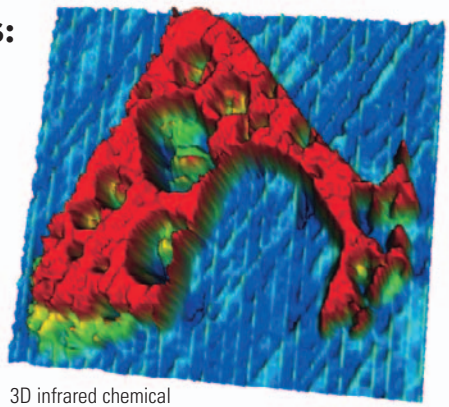
3D rendering of microelectronic devices in a silicon wafer

## Attack Any Sampling Challenge

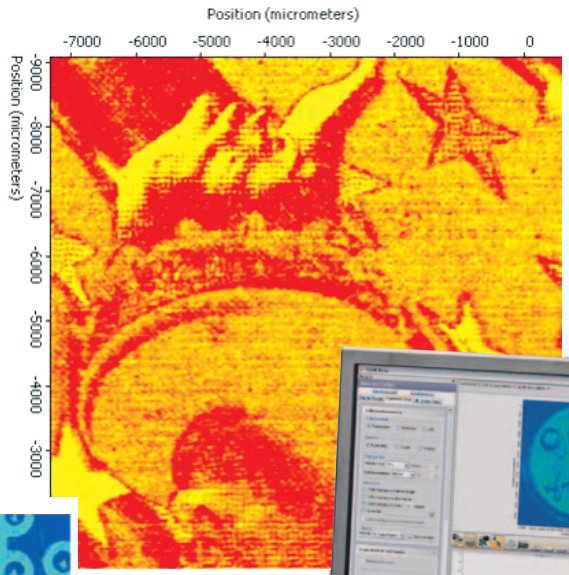
The integrated design of the Nicolet iN10 MX, coupled with a wide angle aperture (0.7 numerical aperture) and entirely gold coated imaging optics gives you the ability to measure any kind of surface or bulk material, faster and easier. The vertical travel of the stage contributes to easy surface measurements of samples as thick as 20 mm, with no need for complex optical arrangements.

## Only the Nicolet iN10 MX Provides:

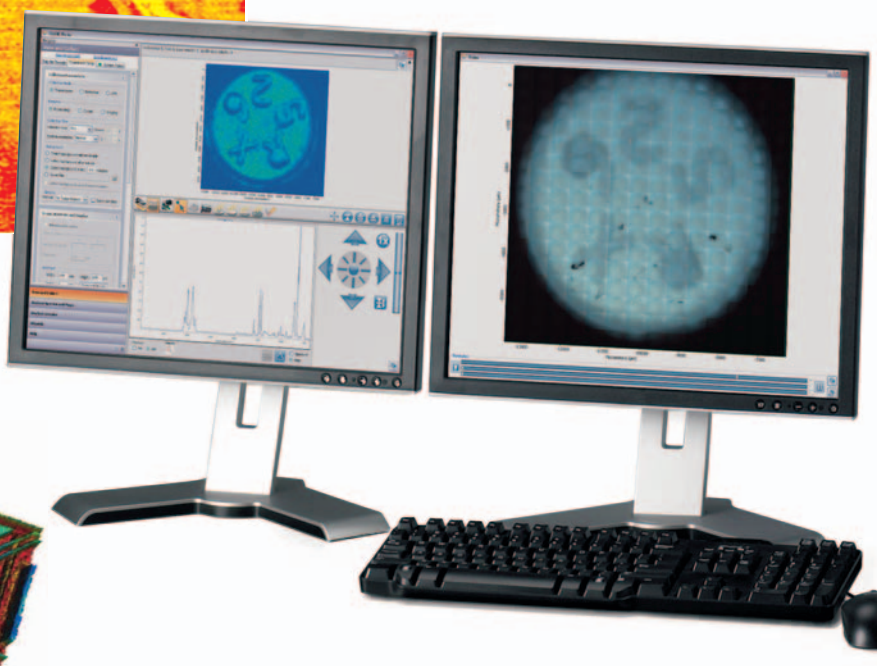
- Unbeatable performance in transmission analysis
- Extraordinary performance in reflectance analysis
- Analysis of samples up to 20 mm thick

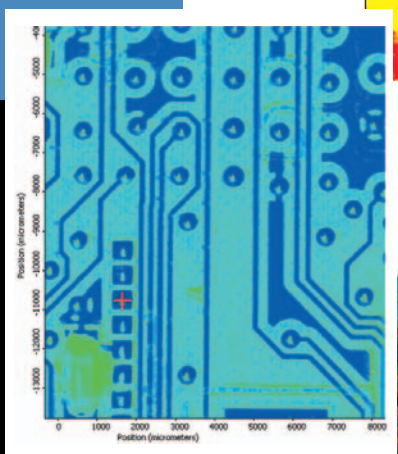


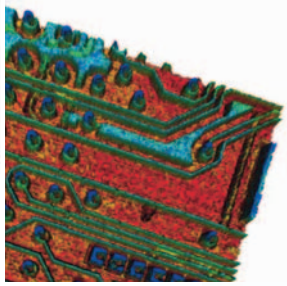
3D infrared chemical image of a bronze statue fragment embedded in 12 mm thick resin block




Infrared chemical image of a USPS postage stamp





Chemical image and 3D rendering of a printed circuit board

# Performance Verification


## System Performance Verification

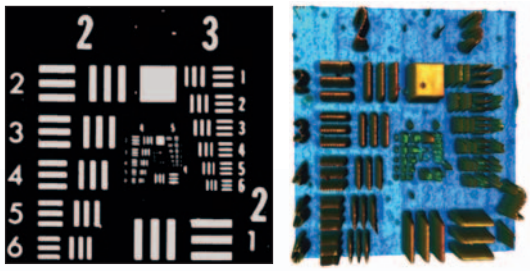
Performance verification is becoming more and more important in forensic science and industrial laboratories. The system performance verification option for the Nicolet iN10 MX microscope includes everything you need to verify the performance of your instrument.

## Verify System Performance, Consistently

- NIST traceable, serialized polystyrene standards for transmission, reflection and ATR
- ASTM validation method (ASTM E1421) automatic performance verification tests
- Quick release validation plate for manual or motorized stage

The performance verification quick-release plate used with ValPro™ software and a motorized stage provides one-click confidence in even the most regulated environment.

– Gold mirror for reflection reference beam collection
– Transflectance polystyrene for reflection testing
– High thickness polystyrene for ATR testing
– Polystyrene film for transmission testing
– Transmission reference beam collection



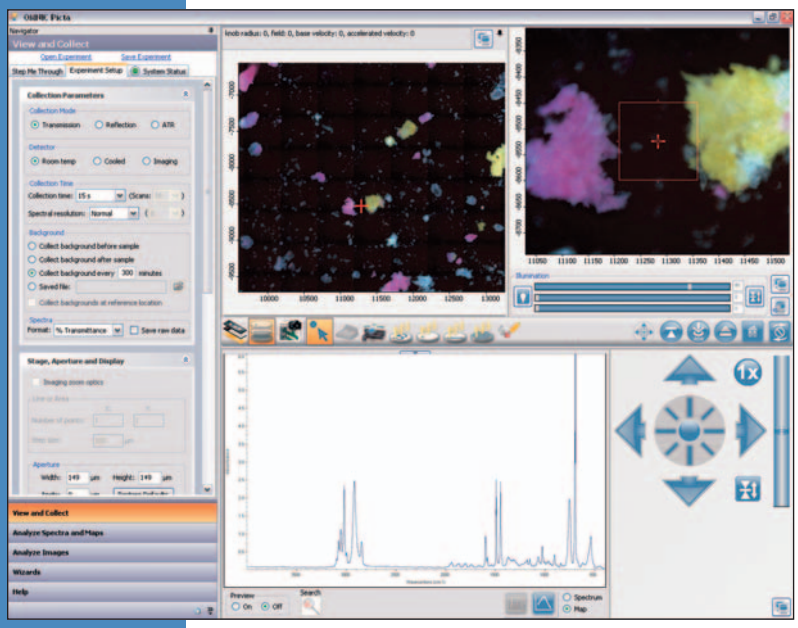
USAF 1951 spatial resolution target (photoresist film layered on $BaF_2$ window) 2D and 3D chemical image at standard spatial resolution.

**Nicolet iN10 MX microscope with Nicolet iZ10 FT-IR module**

# Intuitive

## Sample Loading and Location Made Easy

- Even if you are not familiar with infrared microscopy, there is no better way to start. The Nicolet iN10 MX ejects the stage to the most comfortable position so that you can easily load your sample slide.
- Click on the slide and the sample is there, focused just as well as if a trained microscopist had adjusted the microscope.
- And you can forget about background – the Nicolet iN10 MX quietly takes care of that too.



Designed to be task-oriented, OMNIC Picta presents a highly visual interface of the microscope and directs the Nicolet iN10 MX through a series of operations designed to get the analysis done logically, simply and quickly.

## Intelligent Experiment Set-up

We built the Nicolet iN10 MX to let you set up experiments smoothly. Assisted by OMNIC Picta software, you will be able to drive your instrument with no guesswork. No matter what level of experience in FT-IR microscopy you may have, OMNIC Picta saves you valuable time.

- Entirely software controlled optics
- Error free operation
- Simple user interface

## Infrared Microscope Wizardry

If you are unsure where to start your analysis, simply follow the step-me-through suggestions offered by OMNIC Picta or choose the most appropriate "wizard" for your sample. Select a wizard for particles, random mixtures, or laminates. See how we have shortened the gap between the ease of FT-IR sampling and intricacies of IR microscopy.

- Step-me-through guidelines
- Wizards for particles, random mixtures or laminates
- Preview and Search for real-time sample surveys


Functions and controls are simplified by intuitive visual interface graphics and icons.

*Thanks to its intuitive interface, you don't need to be an expert microscopist to get answers with the Nicolet iN10 MX.*

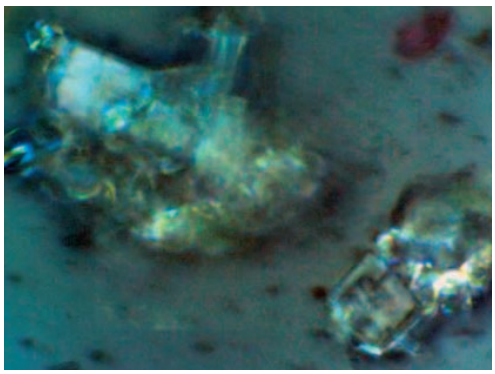
# Innovative

Most infrared microscopes are fundamentally microscopy systems run by an infrared spectrometer. The Nicolet iN10 MX brings truly useful IR chemical imaging into the everyday lab. It is a stand-alone FT-IR imaging microscope with the power to analyze samples with the same simplicity of an FT-IR spectrometer. Performance verification capabilities and an intuitive user interface present the results and the confidence you need for complete answers.


The Contact Alert gauge prevents any damage to your ATR crystal, and applies constant pressure across the sample location, ensuring data consistency and better quality results.

## Designed to Provide Answers...

- Load the sample and *drive*
  - *View sample image on one monitor*
  - *Control IR microscope operations on a second monitor (similar to SEM operation)*
  - *With one mouse click, drive the microscope straight to the sample area you want*



Let the Nicolet iN10 MX provide the best focus and illumination for you

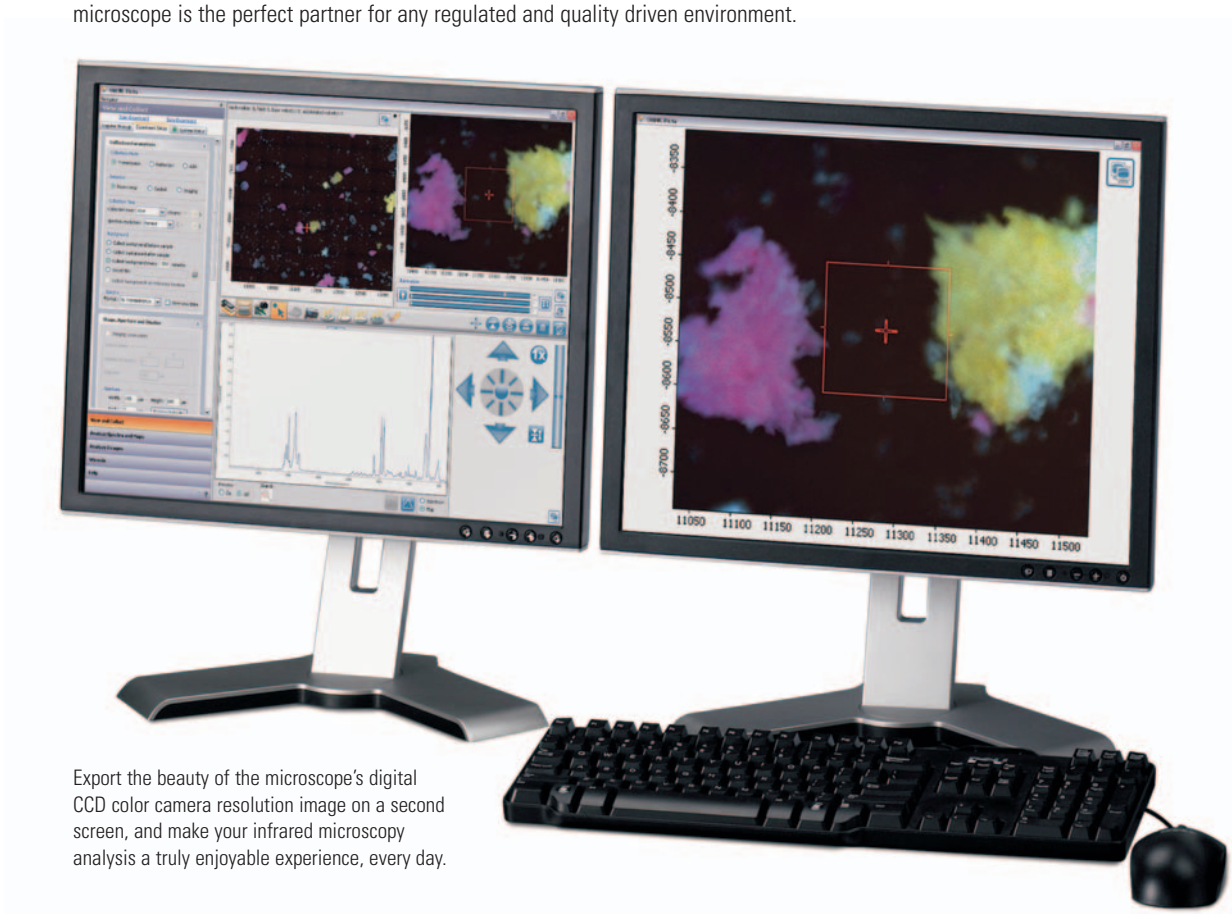
- Infrared microscopy with confidence
  - *Operate your infrared microscope with same confidence of an FT-IR spectrometer*
  - *Certify your answers with instrument performance verification*
  - *Identify materials, even mixtures, with OMNIC Specta software*
- A unique real-time microscopic experience
  - *See the area of interest*
  - *Preview the spectral result*
  - *Search the answer in libraries*
  - *In real time, even when the sample is moving*
- Get answers, not just results
  - *Identify materials*
  - *Measure sample dimensions*
  - *Calculate distributions*

...With a few clicks of the mouse

The virtual joystick provides better flexibility and operating ease. Speed and acceleration are continuously variable, matching how you survey the sample.

## ...With the Confidence You Need

Forensics labs, pharmaceutical labs and all regulated laboratories must ensure with the utmost confidence that the answers they provide are the correct answers. The Nicolet iN10 MX FT-IR microscope is the perfect partner for any regulated and quality driven environment.



Export the beauty of the microscope's digital CCD color camera resolution image on a second screen, and make your infrared microscopy analysis a truly enjoyable experience, every day.

# Integrated

Integrated design means that the FT-IR components are built-in. To you, this means more flexibility and performance. If you already own and use an FT-IR spectrometer, no matter the brand you can incorporate the Nicolet iN10 MX into your laboratory with no compromises.

From the start, we had one goal: make the Nicolet iN10 MX the most powerful and easy to use infrared imaging microscope on the market. Ensure that it delivers unbeatable sensitivity, speed, spatial resolution and real, usable information.

The patent-pending optical design of the Nicolet iN10 MX delivers the most signal from the infrared source to each detector, and optimizes the beam for superior imaging vignetting-free performance. The entire infrared imaging optical path is made with gold-coated mirrors. With the integrated design of the Nicolet iN10 MX, we are able to create the shortest distance possible from source to detector.

## Create Perfect Chemical Images

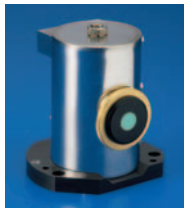
- The Nicolet iN10 MX is a no-compromises infrared imaging microscope built for purpose.
- The patent pending design of the FT-IR optics is fully optimized to provide unparalleled imaging performance.

## Optimize Your Laboratory Needs

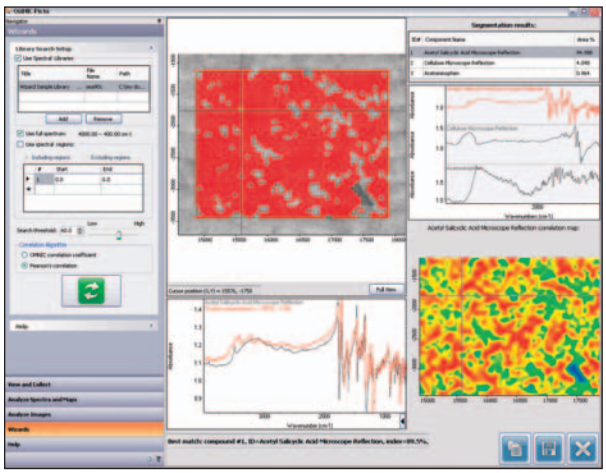
- If you only need to add infrared microscopy to your lab, the integrated design of the Nicolet iN10 MX saves valuable space and money.
- Total integration eliminates any unnecessary component from your laboratory space: even the stage controller and joystick are integrated.

## Focus on Your Tasks, Not the Instrument

- Integration also means you have all the time you need to focus on the answers. Several necessary steps to set up, view, and collect samples are taken care of by the instrument.
- The Nicolet iN10 MX with OMNIC Picta also does all those things a microscopist would do to get best contrast chemical images and to extract physical or distribution information from your samples.



Stainless steel dewar detector allows over 16 hours of data collection with no refill.



OMNIC Picta wizard for random mixtures multiple chemical images self-extraction.

Innovations make the Nicolet iN10 MX unique to all other infrared imaging microscopes:

- Patented MCT and Linear Array dewar design
- Patented Slide-On ATR design
- Patent pending imaging design for vignetting-free analysis
- Patent pending imaging zoom optics
- Patent pending OMNIC Picta routines for sample loading
- Patent pending unique tools for particle analysis, inclusions, chemical images extraction and laminates

# View with Comfort and Confidence

Good quality video capture in infrared microscopy is essential for ease, comfortable viewing, sample observation, and data archiving. With this in mind, we have combined the latest digital imaging technology with an intuitive hardware and software interface.

**Crisp, detailed and vivid color image capturing:**

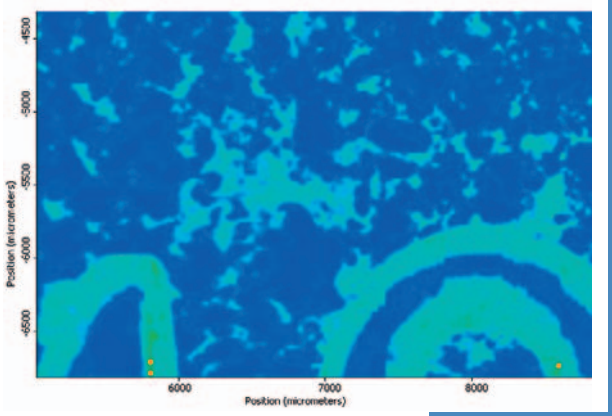
Color CCD digital video camera with independent reflection and transmission illuminations.

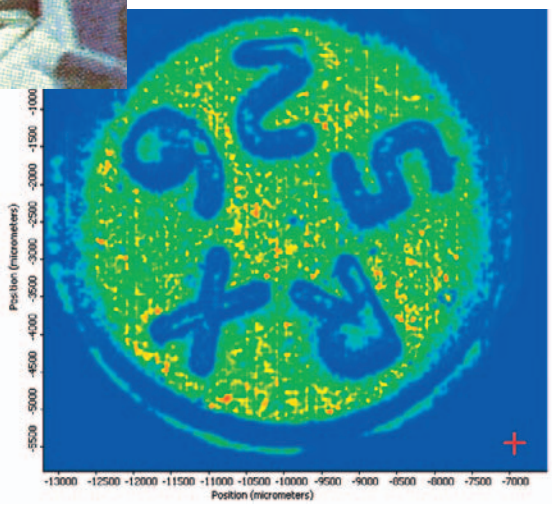
**Simultaneous viewing and collection of the sample:**

Ensures that data is consistent to the measured area, as you can confidently see on the display.

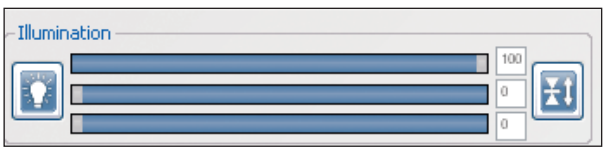
Mosaic of an area on a US dollar bill. For viewing comfort, OMNIC Picta software allows you to view the mosaic or the live video image on a second monitor, keeping the interlaced operation within the two.

Mosaic of a USPS stamp area




Chemical images from pharmaceutical tablets

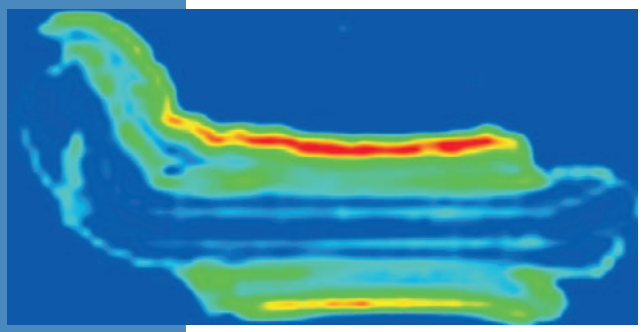



Separate illuminators, software controlled and self optimized for reflection, transmission and aperture.

# Measure with Ultra-Fast Power

Enter into the chemical imaging world with ultra-fast mapping and step up to full-speed infrared imaging. The Nicolet iN10 MX FT-IR microscope includes the zoom optics, the gold coated conditioning optics and the electronics to upgrade to linear array detector, easily, at your site, when needed.

The microscope's ultra-fast mapping is one order of magnitude faster than traditional mapping, which allows you to get superior quality chemical images with minimal investment. You can upgrade to an imaging detector anytime, to further increase your speed.



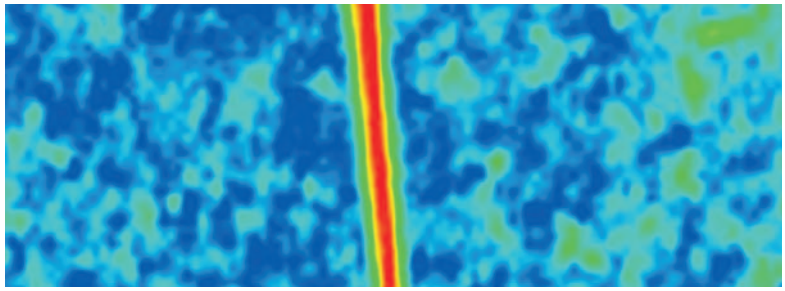
Infrared chemical image of a multilayer film collected with single element detector and aperture set at 20 x 20 microns. Image size 1.2 x 0.6 mm, 2016 spectra at 8 $cm^{-1}$ resolution. Collection time: 8 minutes. Compare with standard mapping, which would take approximately 1 hour and 20 minutes.

## The Power of Ultra-fast Mapping

- Up to ten steps/second at 16 $cm^{-1}$ resolution equivalent to 1.2 x 1.2 mm in only 4.5 minutes at 25 micron spatial resolution
- Standard single element MCT detector
- Spatial resolution better than 10 microns

## The Resolution of Micro-ATR Mapping

- Exceptional sensitivity to measure samples as small as 3 microns
- Exceptional quality spectra of opaque/non reflective samples
- Surface studies and analysis of recessed samples
- Sample thickness up to 20 mm
- Computer controlled, user adjustable uniform pressure
- Energy throughput better than 50%



Contaminant fiber embedded into a bulk material.

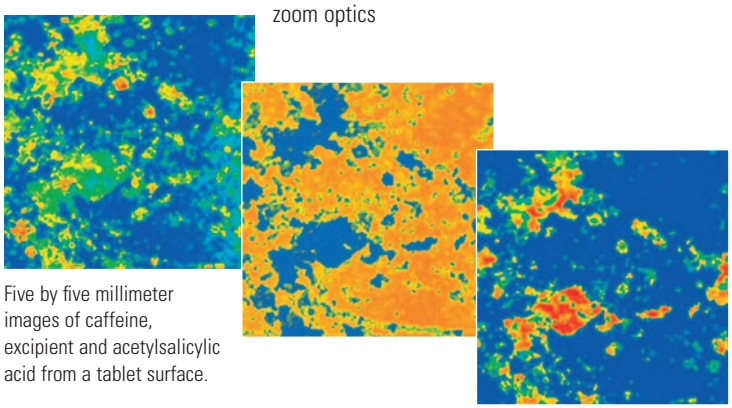
*Ultra-fast mapping opens up the world of infrared chemical imaging.*

# New Perspectives

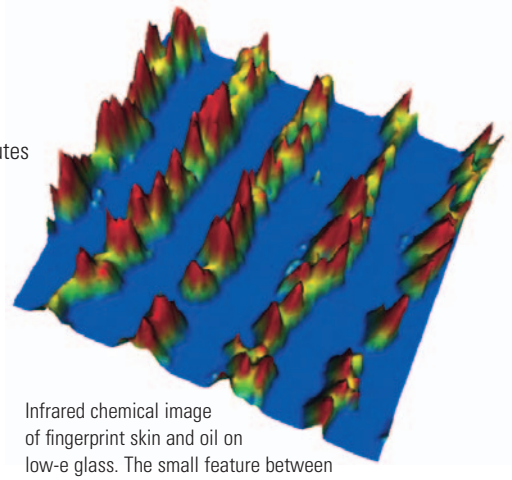
Adding a linear array detector to your Nicolet iN10 MX microscope enables you to collect large size images. This detector also improves data collection speed and gives you the potential to resolve with 3-micron spatial resolution using micro-ATR imaging. You can now measure 5 by 5 millimeter areas in less than 5 minutes.

## The Beauty of Large Maps

- Image sizes up to several millimeters
- Ultra-fast imaging speed, up to 5 x 5mm in less than 5 minutes
- Less than 2 micron pixel size with micro-ATR and imaging zoom optics



Five by five millimeter images of caffeine, excipient and acetylsalicylic acid from a tablet surface.



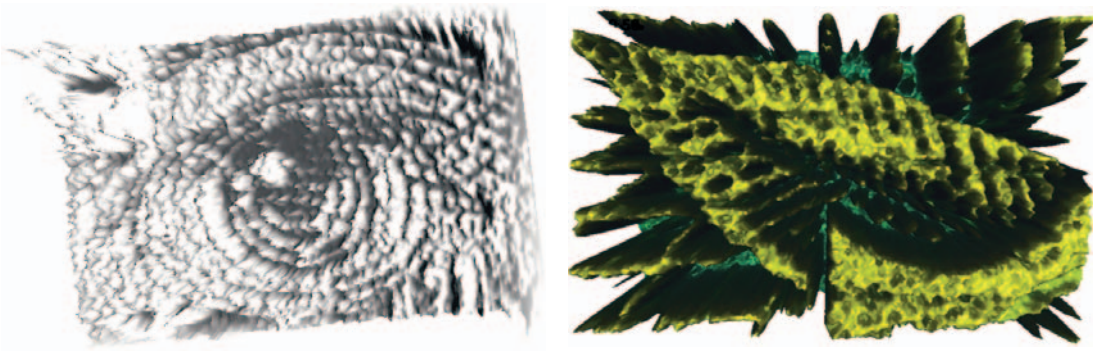
Infrared chemical image of fingerprint skin and oil on low-e glass. The small feature between the two central lines is a foreign particle.

The Nicolet iN10 MX zoom optics extend the resolution power to 4 times that of standard infrared imaging. Fast imaging survey scans are accomplished with lower spatial resolution. Or you can expand the limits of infrared microscopy, with micro-ATR.


12 x 10.5 mm image of a Euro coin acquired in approximate time 25 minutes, 201,600 spectra; 700 Mbytes, spatial resolution 25 micron, spectral resolution 16 $cm^{-1}$, 1 scan per step.

## The Value of Multiple Spatial Resolutions

| Operation | Spatial Resolution Power | Pixel Size at the Sample |
|---|---|---|
| Survey Mode | 50 micron | 30 micron |
| Standard Mode | 25 micron | 25 micron |
| Zoom Optics | 10 micron | 6.25 micron |
| Micro-ATR Imaging | 5 micron | 6.25 micron |
| Micro-ATR Imaging with Zoom | 3 micron | 1.56 micron |



Three dimensional chemical reconstructions of black ink distribution on a paper bill (black and white rendering and color rendering filters). Both images collected with a single scan spectrum per each step.

*Your best step into the IR chemical imaging world.*

# Answers, Not Just Spectra

## The Day-to-Day Challenge

When defects occur in your manufacturing process, when suspected counterfeit goods threaten your brand, or when your quality control laboratory rejects a product – your analytical services day has begun.

## Tough Questions...

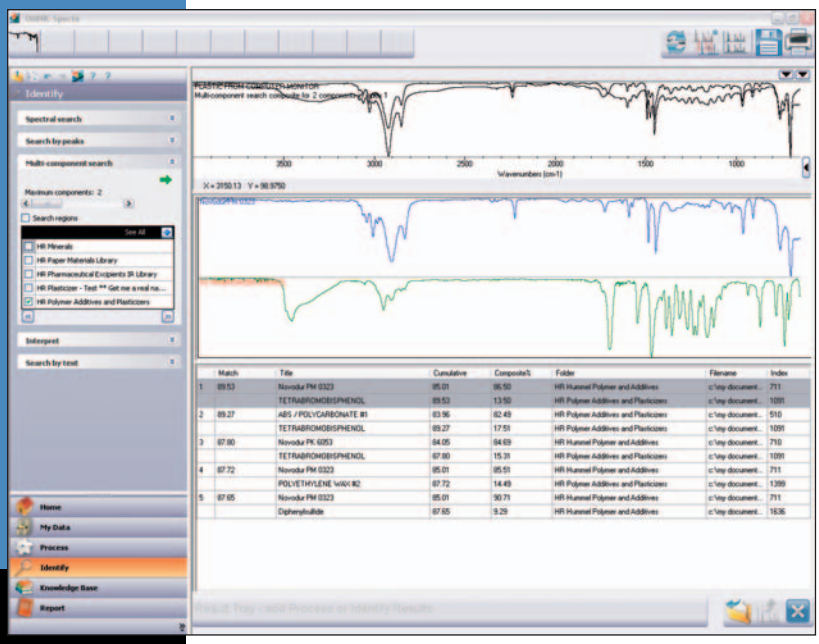
**Q** *What's this "spot?"*

**Q** *What caused this material to fail?*

**Q** *Why doesn't this material pass final inspection?*

Getting to the core of these questions requires an investment in spectral data, the ability to identify mixtures, and the confidence to justify your results. Just getting a good quality infrared spectrum from your sample is not enough!

The Nicolet iN10 MX with OMNIC™ Specta™ software creates a unique combination of infrared microanalysis and spectral identification, guiding you through locating the analysis area, identifying the material, and certifying your assumptions.



OMNIC Specta provides innovative identification and interpretation tools and an unique expert knowledge base. It converts all of the data on your hard disk into an always-ready database and includes a standard collection of 9000 spectra that enables you to efficiently and effectively identify materials. And when even the microscope spatial resolution reaches its limits, OMNIC Specta adds the power of identifying mixed compounds with a mouse click.

## ...Definitive Answers

**A** *OMNIC Specta improves your lab's problem-solving skills and maximizes the Nicolet iN10 MX microscope's analytical power.*

**A** *OMNIC Specta protects and improves the satisfaction of your customers.*

**A** *The Nicolet iN10 MX and OMNIC Specta reduce inconsistent product quality and assist in mitigating product recalls and their related costs.*

## ...Secure Answers

Meet OMNIC Specta software, a unique combination of spectral identification tools, interpretation algorithms, and a knowledge-base of scientific documentation that guides you in identifying and certifying assumptions. Combined with a standard collection of several thousand spectra, you now have the capability for:

- Automated qualitative and semi-quantitative analysis of pure compounds and mixtures
- Comprehensive search and interpretation functionality
- Expert knowledge base
- A database of every spectrum collected and stored on your computer

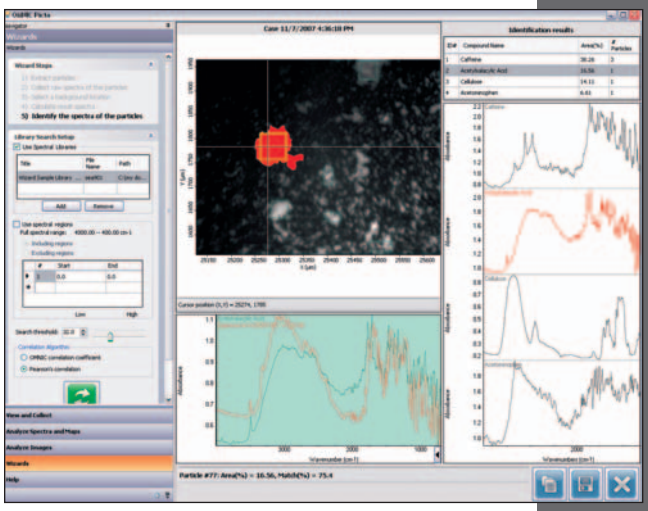
*Get the highest confidence from infrared spectroscopy materials identification and failure analysis.*

# Answers, Not Just Images

Chemical imaging offers the advantage of analyzing the spatial distribution of chemical compounds in the measured area. Acquiring data is only the first step in getting to answers. Extracting chemical images takes much longer than the spectral collection, but still may not provide the physical information or distribution percentage you need to provide a complete answer. The Nicolet iN10 MX and its innovative OMNIC Picta software take you to the "what, where, and how much" effortlessly and in seconds.

## Particle Analysis...

***How many particles are there?***
***How large are these particles?***
***Are they of the same nature?***



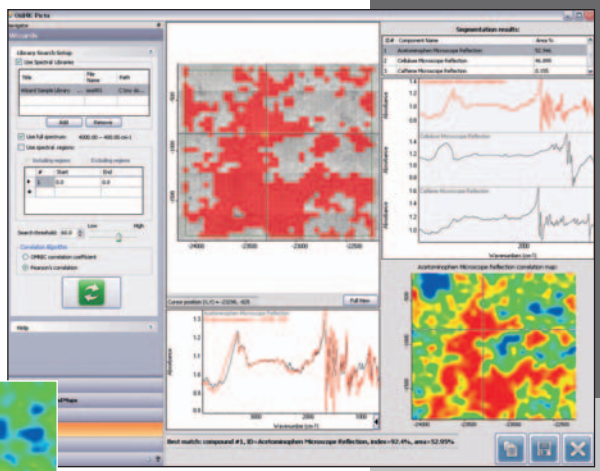
### The Nicolet iN10 MX and OMNIC Specta can do this:

- Find the particles by size
- Measure their dimensions
- Set the appropriate aperture to collect data
- Collect data and reference backgrounds
- Identify and classify particles
- Regroup the information as materials distribution percentage, number and size

***Can traditional mapping provide this level of information?***

## Multiple Compound Structures

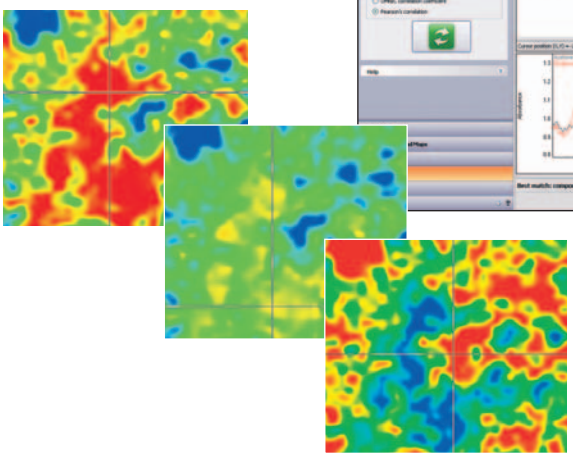
***How many compounds are there?***
***How are they distributed?***
***What is the relative percentage of each one?***



### Once your map acquisition is complete OMNIC Specta:

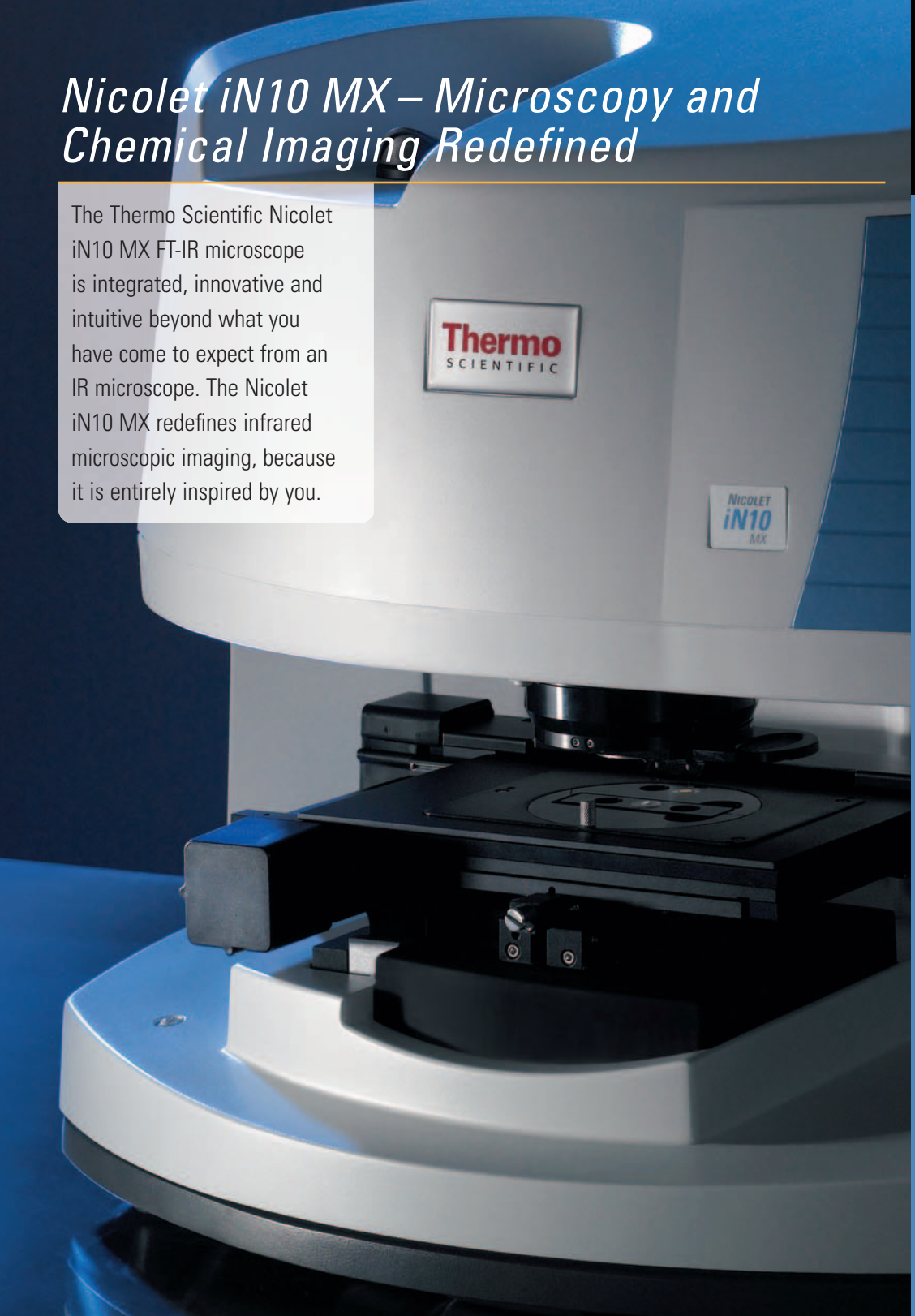
- Finds similarities within your map
- Creates chemical maps for each class identified
- Calculates the total area of each class
- Identifies the compound of each class in your libraries

***Still think acquiring a nice image is the answer?***



# Nicolet iN10 MX – Microscopy and Chemical Imaging Redefined

The Thermo Scientific Nicolet iN10 MX FT-IR microscope is integrated, innovative and intuitive beyond what you have come to expect from an IR microscope. The Nicolet iN10 MX redefines infrared microscopic imaging, because it is entirely inspired by you.




## Fully Integrated FT-IR Microscope

- Integrated design for best performance with no need for an external FT-IR
- Compact footprint, saves laboratory space and budget
- Lowest cost of ownership, no need for liquid nitrogen on samples down to 50 microns

## Innovative Microscopy Tools

- Full computer control, even the joystick is now virtual
- Dual monitor operation, for maximum viewing
- System performance verification, fully automated for maximum confidence

## Intuitive OMNIC Picta User Interface

- Simplified operation and automated routines for most common micro analysis routines
- Spectral identification of pure and mixture compounds with OMNIC Specta software

*In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.*

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