



**ThermoFisher**  
S C I E N T I F I C

**Our latest developments in FTIR, NIR and Raman  
Spectroscopy – Sofia 18 October 2017**

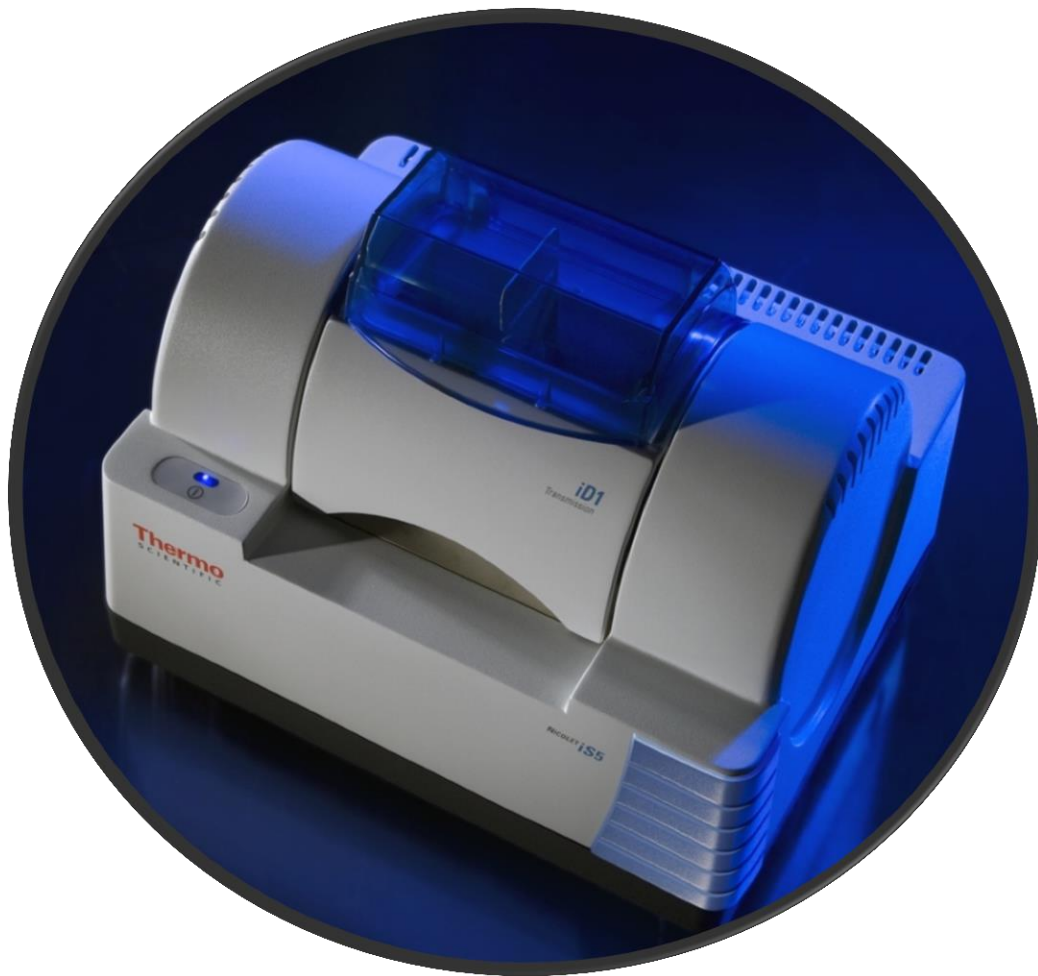
Steve Reynolds  
Molecular Spectroscopy Sales Manager

## Material and Structural Analysis

- Molecular spectroscopy
  - FT-IR spectrometers, software and accessories
  - FT-IR microscopy and imaging, software, accessories and consumables
  - FT-NIR analysers, software, accessories and consumables
  - Infrared gas analysers
  - Raman spectrometers, software and accessories
  - Vis and UV/Vis spectrophotometers, software, accessories
  - Micro UV
  - NMR



# Nicolet iS5 FT-IR Spectrometer



- Premium Performance
- Configurable Sampling Options
- Compact, Rugged Design
- Competitively priced

# Nicolet iS10 FT-IR Spectrometer

- 0.4 cm<sup>-1</sup> resolution standard
- Signal/Noise 35,000:1
- DTGS standard, MCT-A optional
- External IR beam port
  - Microscope, AEM
- Mid/Near-IR range fixed B/S (KB)
  - Extended range XT-KBr option
- OMNIC Software Integrates:
  - Atmospheric suppression
  - QCheck™ QA/QC Verify Function
  - System Performance Verification
- TGA capabilities



# Nicolet iS50 FT-IR Spectrometer

- Multirange data collection
  - Manual or Automatic
- Multiple Sampling Locations
- Multiple Hyphenation Techniques



- Integrated FT-IR Microscope
- Wizard driven data collection and analysis
  - Particles, Laminates, Random mixtures
- Full performance validation
- Transmission, reflection and ATR sampling modes
- High optical efficiency allows room temperature DTGS detector
- MCT-A LN<sub>2</sub> cooled detector option adds superb sensitivity
- Simultaneous viewing, collection and searching



# Nicolet Continuum™



- Infinity-corrected optical design
- Single-point microscopy with fast mapping stage
- Dual remote aperture – ultimate spatial resolution
- Dual detector option
- Simultaneous view & collect
- DIC, polarization, fluorescence for visualization
- Transmission, reflection, ATR, Grazing Angle objectives
  - Ge Tip ATR™
- Powerful data processing and visualization software
- USB Digital Camera with software autofocus

# Nicolet iS5/Czitek SurveyIR Microscope

- User installed in compartment
- Uses on board FT-IR spectrometer detector
- IR Reflection, Attenuated Total Reflection and transmission modes available
- Applications: FT-IR microspectroscopy of fibers, paints, polymers, fabrics, pharmaceutical active ingredients, excipients, narcotics, explosives, and minerals.
- SurveyIR is ideal for use in analytical services, quality assurance, educational, and forensic labs. Drug characterization, Forensic Science, Fiber analysis, Contaminant id





# Nicolet iN5 FTIR Microscope

- Simple walk up and use design
- Completely manual operation
  - Fixed and variable apertures available
- Detectors
  - No Fuss room temperature
  - High sensitivity Liquid nitrogen cooled
- 10x fixed objective



# DXR2 Raman Microscope



- Dispersive Raman micro sampling
- Class I Laser-Safe enclosure
- True Confocal microscope design
  - Excellent Depth Profiling
- Spatial Resolution  $\leq 1$  micron
- Patented Autoalignment
- Integrated components
  - Filters, gratings, lasers
- Patent-Pending autoexposure and autofocus capabilities
- True “Point and Shoot” Raman spectroscopy

# DXR2xi Raman Imaging Microscope

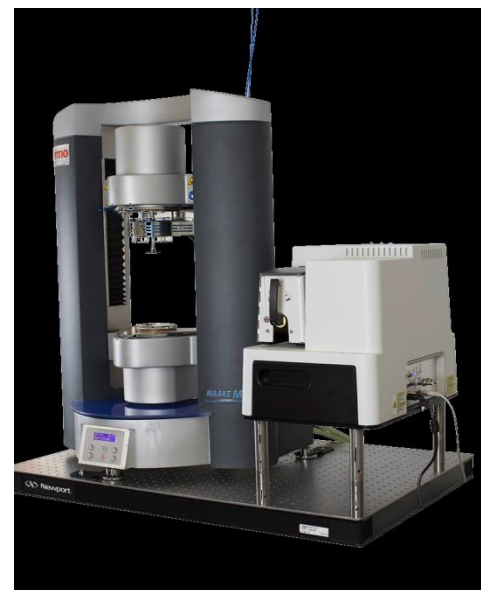
A total imaging system: hardware and software integration combines **powerful performance** with **image-centric** analysis and **ease of use**



*A completely new approach to Raman imaging!*

## Why Raman multi-modal analysis?

- Allows same point, same time measurements alongside primary or complementary measurement
- Measures under exactly the same conditions ensuring confidence in correlation
- Helps to establish cause-and-effect relationship  
Between a material's chemistry and its properties
- Eliminates time consuming and difficult secondary measurements



# Antaris II™ NIR<sub>FT-NIR</sub>



- Rugged, reliable FT-NIR analyzer
- Easy to use dedicated analysis RESULT software
- Comprehensive validation and qualification package
- Direct software connection to chemometrics: TQ Analyst™
- OPC: Makes decisions and takes action
- USB control
- Simultaneous transmission and reflection from tablets

# Antaris IGS

- Dedicated FT-IR gas analyzer
- Industrial table top & rack mount system configurations
- 0.5 cm<sup>-1</sup> resolution at 2 Hz data collect
- Nicolet Series high quality system components: source, laser, interferometer
- RESULT, TQ and ValPro validation
- Integrated heater control and pressure monitoring
- Custom Solutions Services and factory gas calibrations



# Introducing the new Nicolet iS5N FT-NIR Spectrometer

- What is the Nicolet iS5N?
  - Extension of the successful iS5 product into the NIR spectral range
  - New entry into the Thermo Scientific NIR portfolio
- Who is the Nicolet iS5N customer?
  - Existing customers looking to deploy routine NIR QC methods
  - Chemical market with incoming and in-process liquid monitoring needs



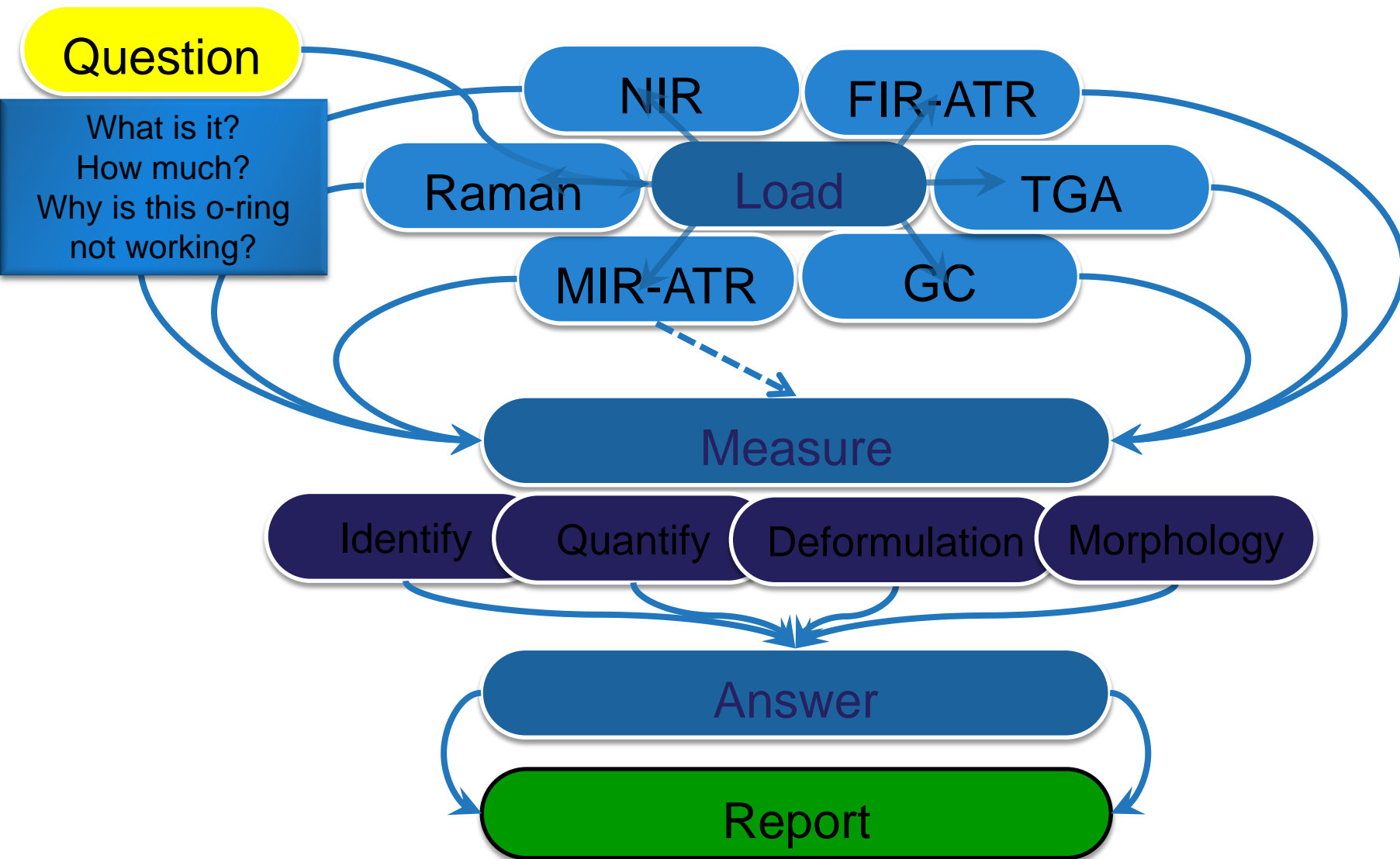
The image features a ThermoFisher Nicolet iS50 FT-IR spectrometer, a white and blue laboratory instrument, positioned in the foreground. The spectrometer is set against a background of a glowing blue and white Earth, with several large, textured blue spheres floating in the dark space behind it. The spectrometer has various components labeled, including 'iS50 ARX' on a top-mounted unit and 'iS50 FT-IR' on the main body. The ThermoFisher logo is visible on the front left of the instrument.

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# Nicolet iS50: Unleashing Analytical Power



# The Analytical Laboratory Workflow



# Discover the Nicolet iS50...

- Unsurpassed **Flexibility**
- Unprecedented **Integration**
- Ultimate **Simplicity**

*...Beyond FT-IR, beyond the ordinary, beyond expectations*



- Multirange data collection
  - Manual or Automatic
- Multiple Sampling Locations
- Multiple Hyphenation Techniques



# Multirange made Simple

- Automatic Beamsplitter Exchange
- Triple Detector Mount
- Total Multi-range control



# Flexibility

- Full size sample compartment
- All Smart Accessories supported
- All standard accessories supported

# Nicolet iS50

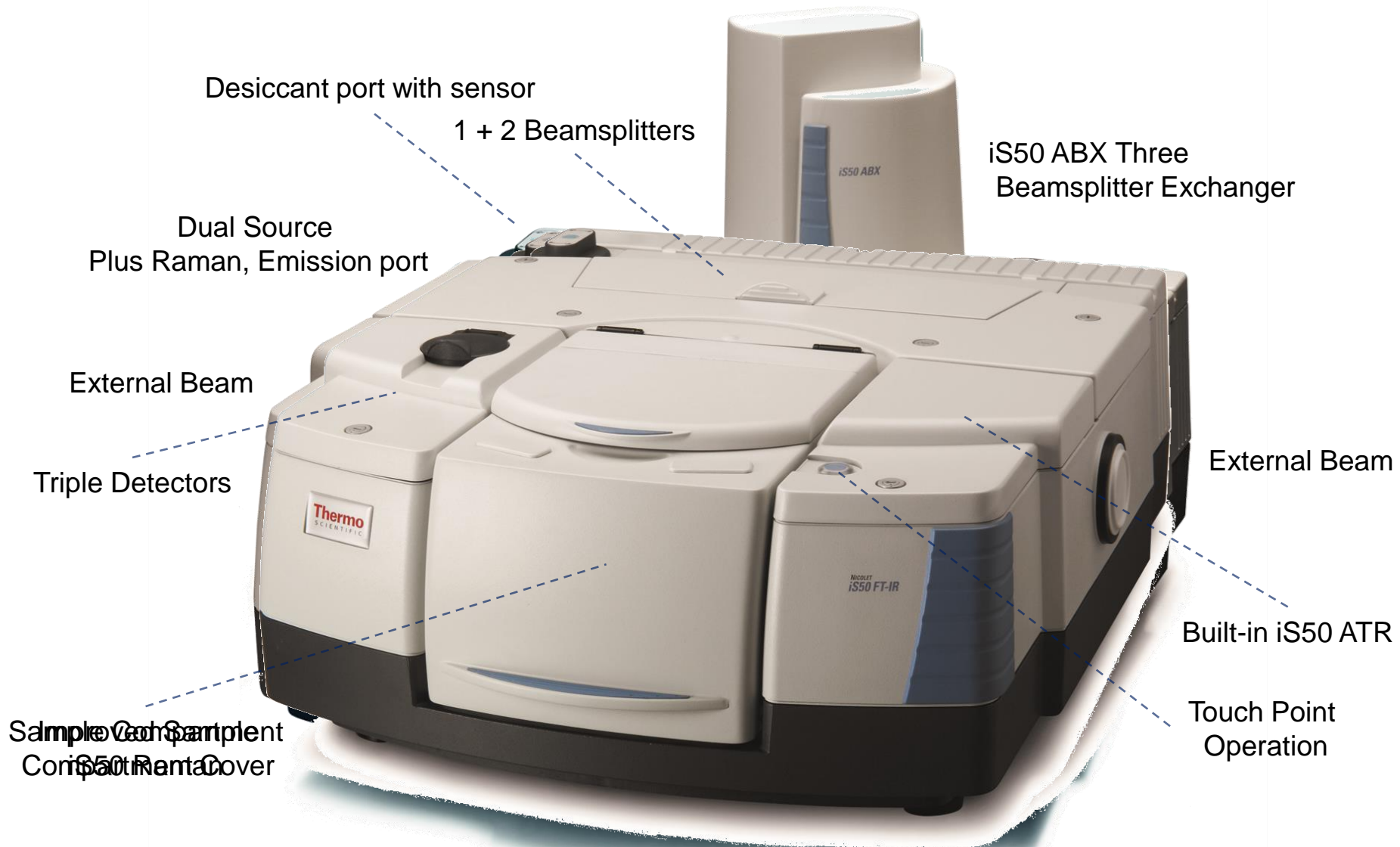


# Increased Value

- Smaller Footprint means more laboratory space for other tools
- Great Performance means getting data when the going gets rough
- More Capabilities means have the tools – when you need them



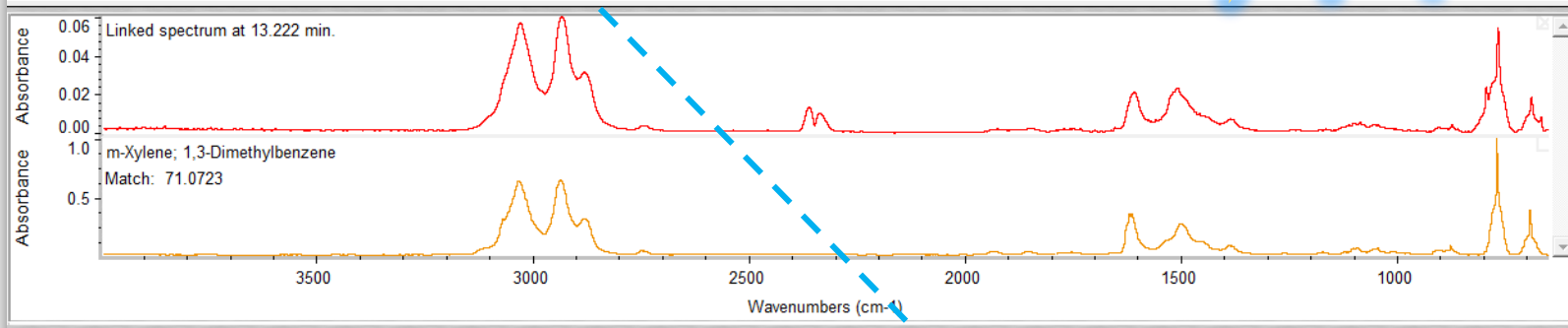
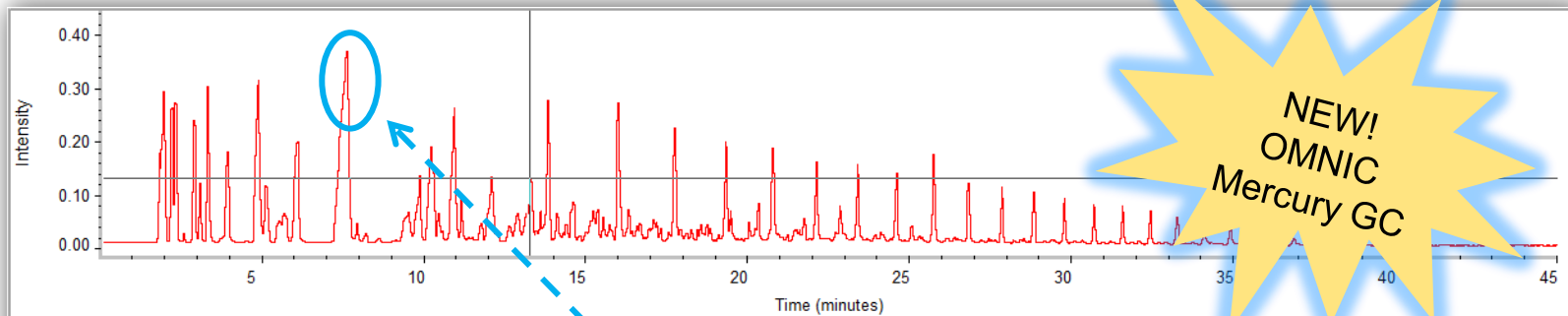
# The Nicolet iS50 FT-IR Grows



- Continuum FT-IR microscope
- In-compartment TGA-IR
- External GC-IR interface

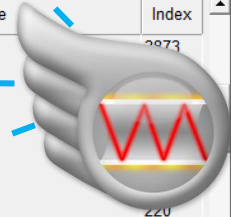




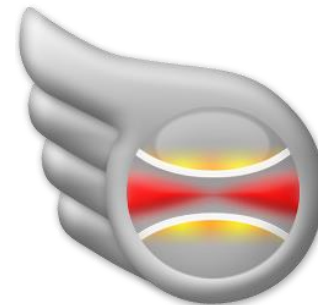


Retention Time	Match	Compound Name	Library Name	Index
8.1250	52.0531	Carbon dioxide	HR Nicolet Vapor Phase	2973
9.4314	78.1214	2-Methylheptane	HR Nicolet Vapor Phase	
9.7819	87.1418	Toluene; Methylbenzene	HR Nicolet Vapor Phase	
10.1324	89.0256	1,3-Dimethylcyclohexane, cis-	HR Nicolet Vapor Phase	
10.3873	60.1657	1,1-Dimethylcyclohexane	HR Nicolet Vapor Phase	
10.8652	93.2497	2-Aminooctane; 1-Methylheptylamine	HR Nicolet Vapor Phase	
11.0883	74.3754	1,3-Dimethylcyclohexane, trans-	HR Nicolet Vapor Phase	
11.6937	70.6362	Mineral spirits; Liqroin	HR Nicolet Vapor Phase	
12.0123	94.0005	Propylcyclohexane	HR Nicolet Vapor Phase	220
12.5540	55.2237	Guaiene; 1,4-Dimethyl-7-isopropylidene-1,2,3,4,5,6,7-	HR Nicolet Vapor Phase	343
12.8089	80.9681	2-Methyloctane	HR Nicolet Vapor Phase	45
13.2231	71.0723	m-Xylene; 1,3-Dimethylbenzene	HR Nicolet Vapor Phase	4421
13.5417	77.5364	2,6-Dimethylcyclohexanemethanol	HR Nicolet Vapor Phase	1005
13.7648	92.1922	Nonane	HR Nicolet Vapor Phase	10
14.0197	76.1310	2-Aminooctane; 1-Methylheptylamine	HR Nicolet Vapor Phase	1705
14.3383	66.4692	Butylcyclopentane	HR Nicolet Vapor Phase	217

1. Co-adds spectra
2. List peaks by retention time
3. Identifies separated substances

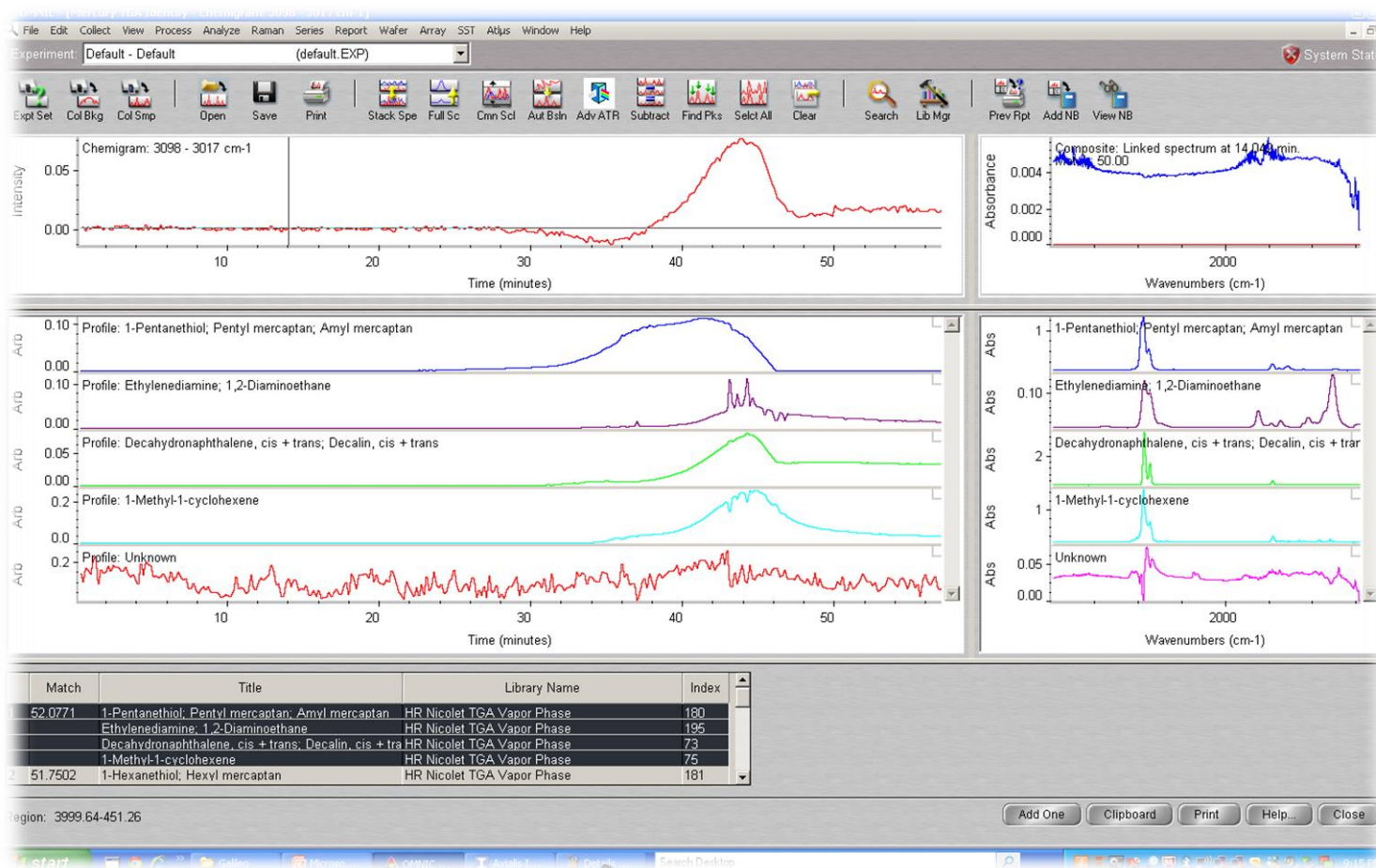


- Same in-compartment interface, now empowered by built-in ATR
  - Smaller foot print and less work
- New OMNIC Mercury TGA software
  - TGA / FT-IR made easy!



**NEW!**  
**OMNIC**  
**Mercury TGA**





1. Identifies gas species
2. Creates profiles
3. Summarizes material composition

- Up to 5 sampling stations and 3 spectral ranges
- No need to configure optics, or manual set-up
- Touch-Points to “get there” and run samples





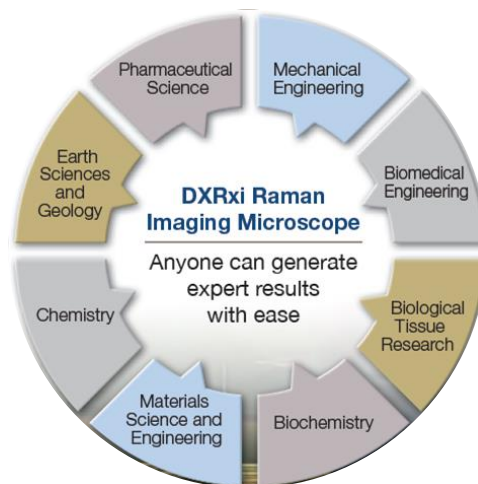
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## Rethinking Raman Imaging

- The new
- DXR2xi Raman Imaging Microscope

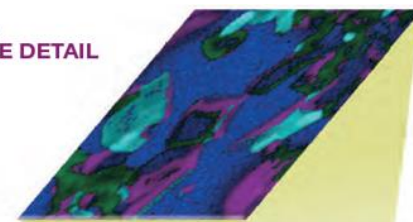
# The Raman Imaging Value Proposition

***The instrument should provide a tool for all users, from basic to advanced***

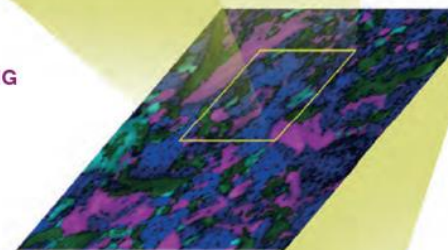


***Advanced materials analysis benefits from an image-driven approach***

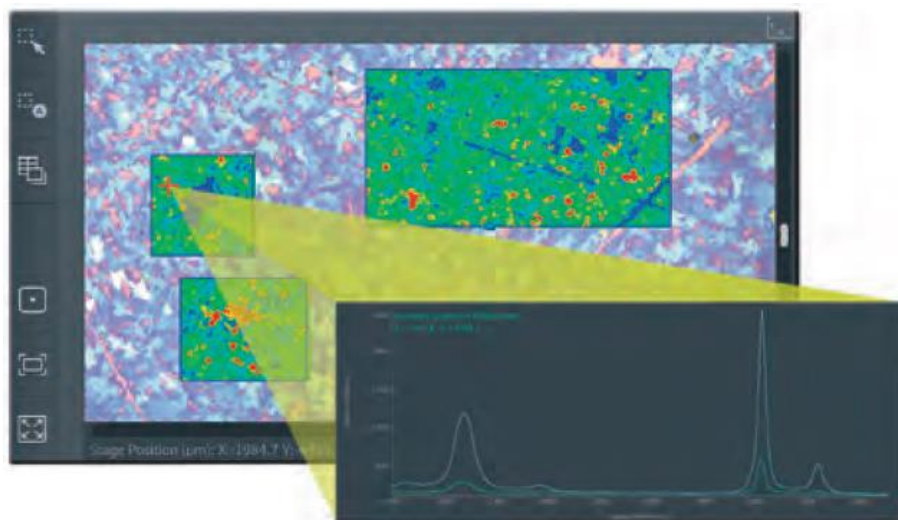
The performance advantage of **FINE DETAIL**



The agility of **RAPID IMAGING**



The **POWER** to look over large areas



***Emphasis on microscopy, powered by spectroscopy keeps the answer in focus***

# The Multiuser Laboratory Toolkit

- **Multiple techniques** are increasingly used with the same sample
- Strong emphasis on **image data** and **data visualization**
- ~70% of those polled use **SEM/TEM**, ~50% use **AFM**
- Work continues to become more **interdisciplinary**, requiring broad **proficiency with many different instruments**



# Introducing the DXRxi Raman Imaging Microscope

A total imaging system: hardware and software integration combines **powerful performance** with **image-centric** analysis and **ease of use**



*A completely new approach to Raman imaging!*



# Powerful Integration: “Microscopy First Approach”

“Spectroscopy first”  
approach



VS.

“Microscopy first”  
approach



**OTHER RAMAN INSTRUMENTS**

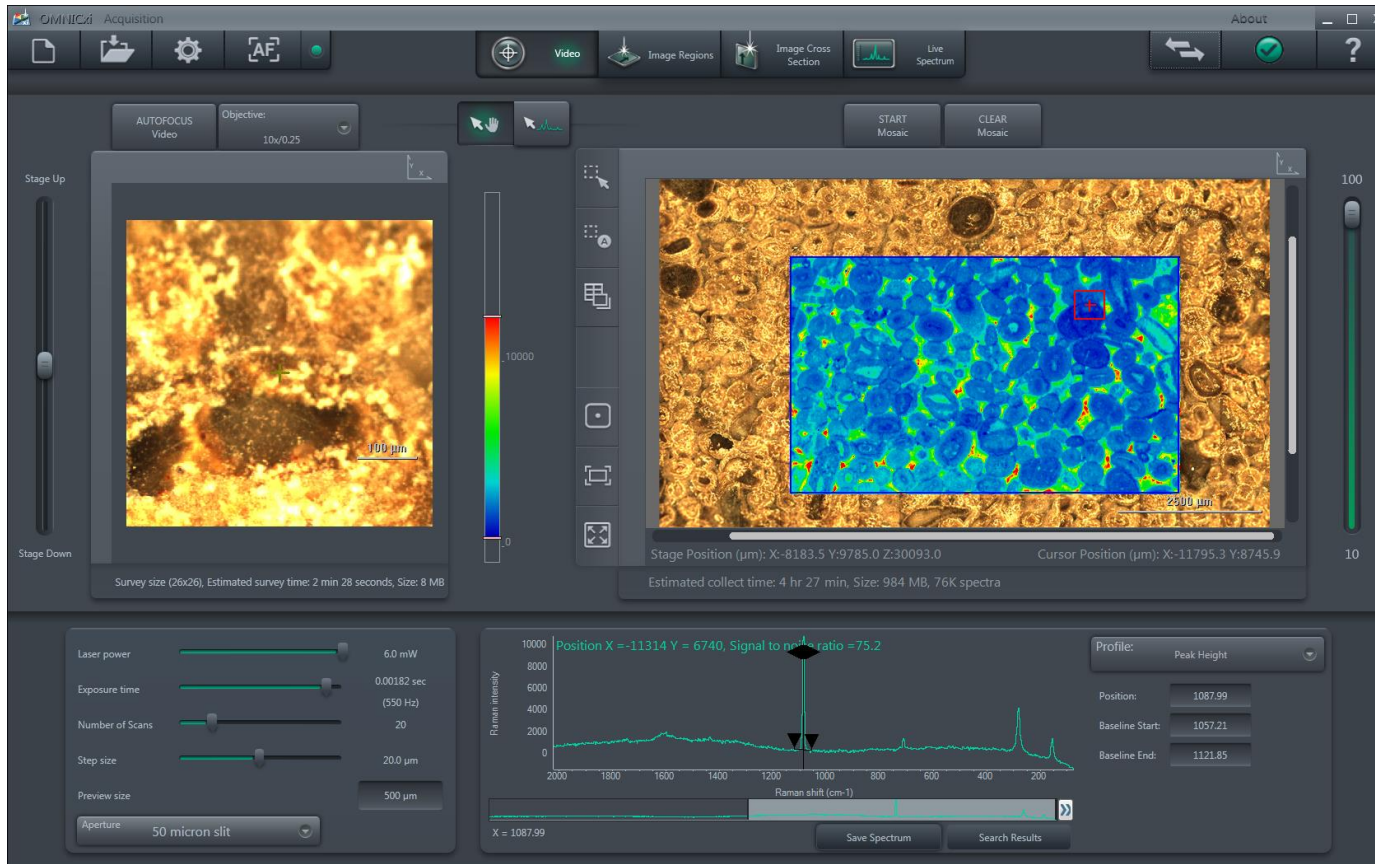
**DXR2xi RAMAN IMAGING  
MICROSCOPE**

*Would you rather be a rat in a maze or an eagle in the sky?*

# Image Centric Software: OMNICxi for Raman Imaging

**Chemical image preview provides one click Raman imaging and instant gratification**

**Location of video and chemical image previews tied to mosaic**



**Sliders allow change of parameters on the fly to give immediate feedback**

**Simple, clean design is easy to navigate and visually striking**

# DXR Family Interchangeable and Upgradeable Components

- All DXR laser, filters, gratings, and microscopy accessories (objectives, sample holders, etc.) are compatible with the DXRxi
- Maximize value with shared components

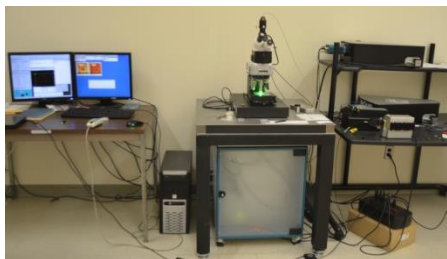


## Adaptability to any application, configurable by any user

- Pre-aligned and lock-in-place components use automatic recognition and stored alignment, allowing any user to reconfigure an instrument in seconds
- Data standardization between excitation laser wavelengths
- Lasers and other components can be interchanged and shared with every instrument in the DXR Raman family



# Performance: Total Experiment Time



**Typical  
“research  
Raman”  
instrument**

**DXRxi Raman  
imaging  
microscope**



<b>Configure Instrument</b>	0.5 - 2 DAYS	8 - 10 MINUTES
<b>Align &amp; Calibrate</b>	1 - 4 HOURS	5 - 10 MINUTES
<b>Mount &amp; Target Sample</b>	1 - 60 MINUTES	1 - 10 MINUTES
<b>Optimize Parameters</b>	5 - 20 MINUTES	1 - 2 MINUTES
<b>Collect &amp; Process Data</b>	3 - 20 MINUTES	5 MINUTES - 2 HOURS performed in real-time – as little as a few minutes
<b>Interpret Data</b>	0.5 - 2 DAYS	1 - 2 MINUTES
<b>Apply Results</b>	5 - 20 MINUTES	



***Ease of Use Has BIG Impact on Reducing Time to Answers***

Thank you!