



Nový Summit FTIR spektrometer

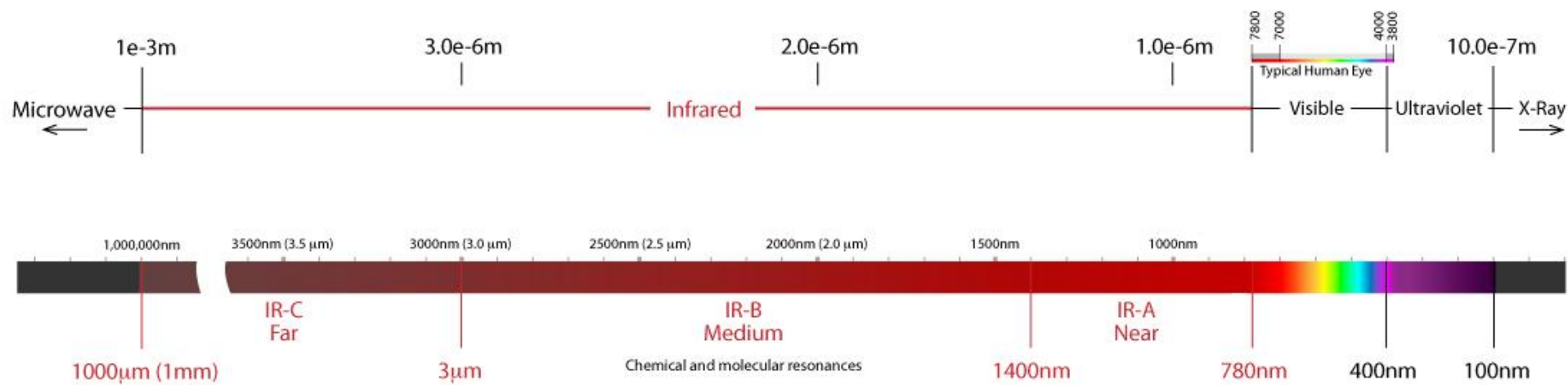
M. Danková

AGENDA

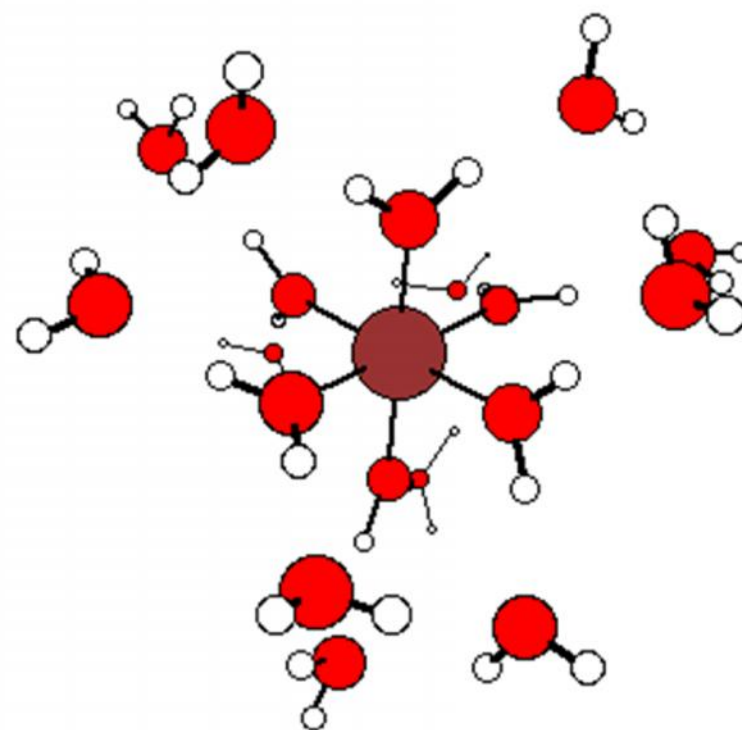
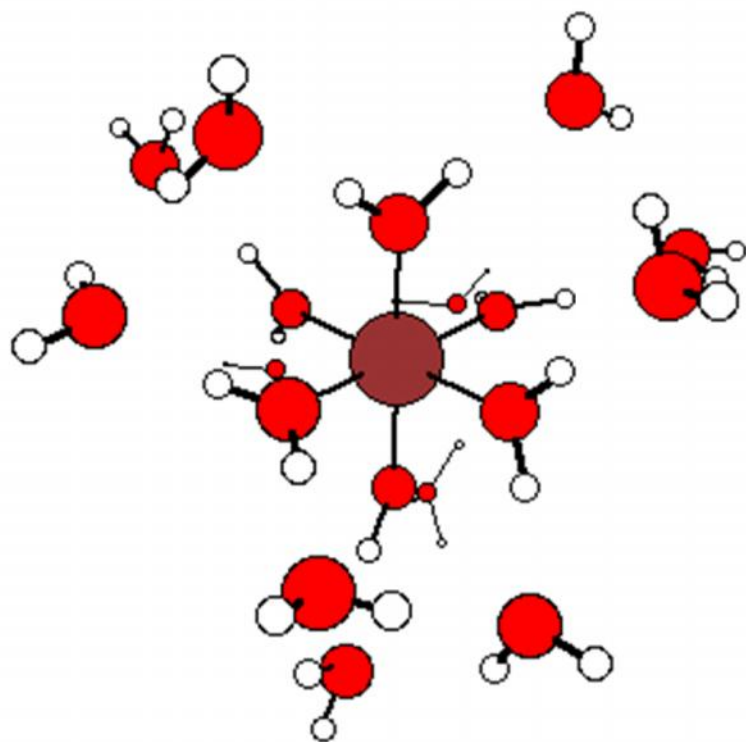
- Theory
- Summit FTIR Spectrometer
- Paradigm
- Accessories



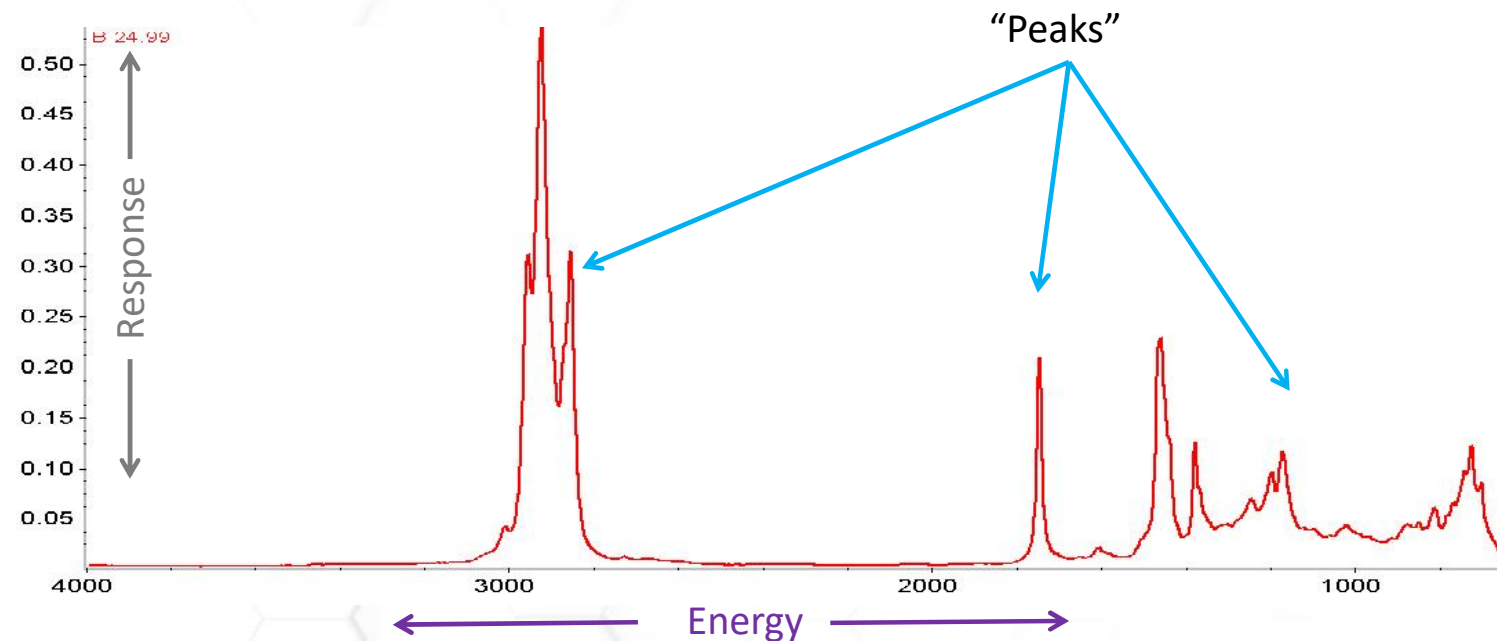
THEORY



THEORY



BASICS



Energy varies along the x-axis

Expressed in wavelength (nanometers, microns) or Wavenumber (cm^{-1})

Response (Intensity) is along the y-axis

Absorbance, transmittance, specular or diffuse reflectance, Raman scattering

Peaks occur because different molecules interact with light differently

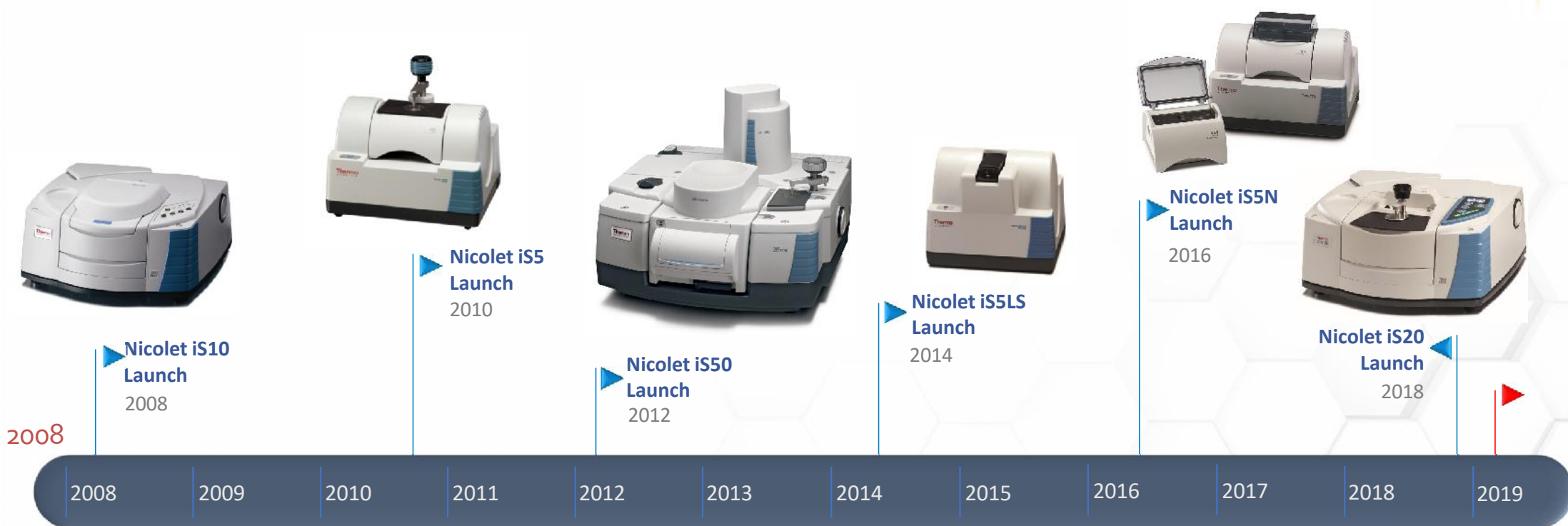
This is what enables spectroscopy to tell us something!



THE POWER OF MOLECULAR SPECTROSCOPY

- You can work fast...
 - Little or no sample prep, rapid screening
- ...on a range of samples...
 - Organics, inorganics, films, coatings, paper, fibers, gases more
- ...and answer basic questions...
 - What is this stuff? How much is in there? In what form?
- ...or advanced questions.
 - What is the film thickness? What is the orientation? How do viscoelasticity and chemistry relate?

SPECTROMETERS



NICOLET SUMMIT FTIR SPECTROMETER

• STANDARD

1

PRO

2



New optical engine (LightDrive)

- Source, interferometer, and laser
- Improved performance and 10-year warranties

Hardware/Software Integration

- Integrated Windows 10 computer
- Available with on-board touchscreen display
- Multi-colored LightBar (diagnostics, status, Smart Background)

OMNIC Paradigm Software

- New desktop and touchscreen software
- Significant improvements in customer experience



NICOLET SUMMIT FTIR SPECTROMETER



1

Nicolet Summit (Standard)

- Mid-infrared SiN source
- KBr/Ge beamsplitter
- Diode laser
- DTGS detector
- Fixed aperture

2

Nicolet Summit PRO

- Mid-infrared SiN source
- KBr/Ge Beamsplitter
- Diode laser
- TEC DTGS detector
- Motorized, high-res aperture
- 5,000 additional reference spectra



LIGHTDRIVE OPTICAL ENGINE



Infrared source

- Same design as Nicolet iS20/iS50
- Single-point, non-migrating hotspot
- More reproducible peak shapes

Interferometer

- Improved resolution
- Increased reliability
- Better long-term stability

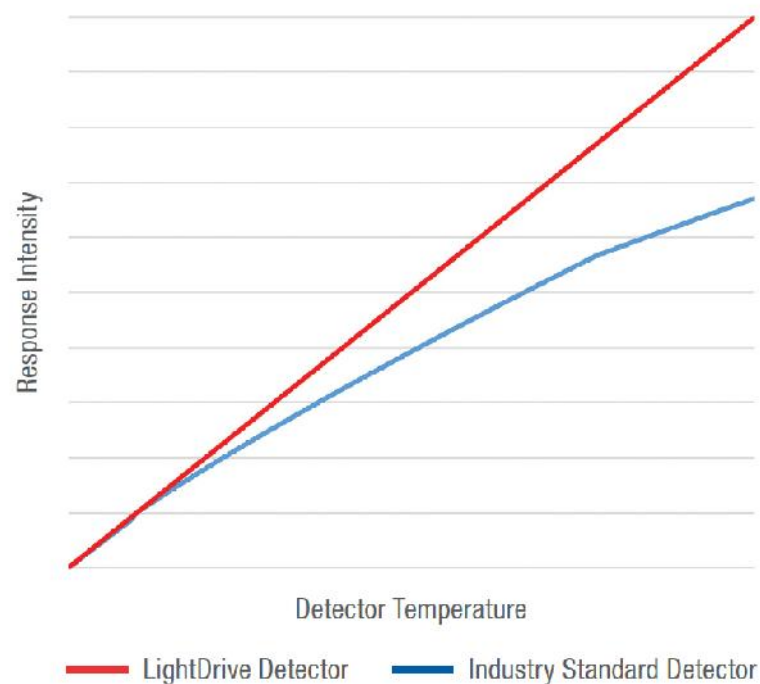
Diode laser

- Solid-state, temperature controlled
- Long-lifetime
- Minimizes future costs

Detector

- DTGS
- TEC included on PRO version
 - Improved response linearity

pragolab



SMART BACKGROUND

Why do we collect backgrounds?

When do we collect backgrounds?

Is there a better way to do it?

SUMMIT automatically collects backgrounds...in the background



LIGHTBAR



NICOLET SUMMIT FTIR SPECTROMETER

Technical specification



- **Spectral Range:** 8,000–350 cm^{-1} optimized, mid-infrared KBr beamsplitter
- **Spectral Resolution:**
 - Summit Spectrometer – better than 0.6 cm^{-1}
 - Summit PRO Spectrometer – better than 0.45 cm^{-1} (superior line shapes)
- **Signal-to-noise:**
 - Summit Spectrometer – 35,000:1 (peak-to-peak, one minute)
 - Summit PRO Spectrometer – 40,000:1 (peak-to-peak, one minute)
- **Wavenumber Precision:** 0.001 cm^{-1} at 2,000 cm^{-1}
- **Wavenumber Accuracy:** 0.05 cm^{-1} at 2,000 cm^{-1}
- **Ordinate Linearity (ASTM E1421):** <0.15 %T deviation from 0.0%T
- **Infrared Source (LightDrive):** Non-migrating hotspot, single-point source for unmatched data reproducibility (>10 years)
- **Laser (LightDrive):** Solid-state, temperature controlled diode laser with long lifetime (>10 years)
- **Interferometer (LightDrive):** Dynamically aligned interferometer with KBr/Ge mid-infrared beamsplitter optimized for highest spectral throughput (>10 years lifetime)

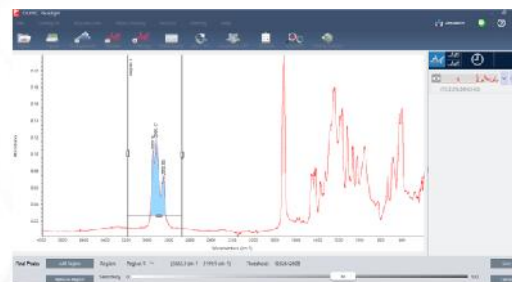
NICOLET SUMMIT FTIR SPECTROMETER

Technical specification



- **Detector:**
 - Summit Spectrometer – Fast-recovery deuterated triglycine sulfate (DTGS)
 - Summit PRO Spectrometer – thermoelectrically cooled (TEC) DTGS for maximum detector response linearity
- **Size (W x H x D):**
 - Standard configuration: 34 cm x 24 cm x 32 cm, With touchscreen: 53 cm x 43 cm x 32 cm;
 - Weight: Standard configuration – 10.9 Kg, With touchscreen – 12.6 Kg
- **User Interface/Connection:**
 - Integrated touchscreen for local control on the instrument (optional)
 - Mini-display port connection to monitor
 - Ethernet connection to laptop computer
 - Wireless/Remote control via WLAN (optional)
 - LightBar: Multi-colored LED bar displays system status and spectral library match value/QCheck result
- **Background collection:**
 - Standard background collection (i.e., user initiated)
 - Smart Background collection (background collected while instrument is idle)

OMNIC PARADIGM



New Technology

- Modern coding language and architecture for easier development
- 64-bit technology
- Multi-core capabilities for faster processing
- New connectivity options (system-on-module)
- Database infrastructure

Improved Usability

- Right clicks
- Contextual searching
- Automatic workflow creator
- Mobility and cloud-computing
- Advanced instrument health tracking
- Multiple screen/dual monitors

Modern Design

- World-class visual design
- Ability to have more than 8 colors
- New tutorials and help
- Dashboard home screen to quickly find, open, and collect data
- Easy workflow execution on touchscreen software

Familiarity of old

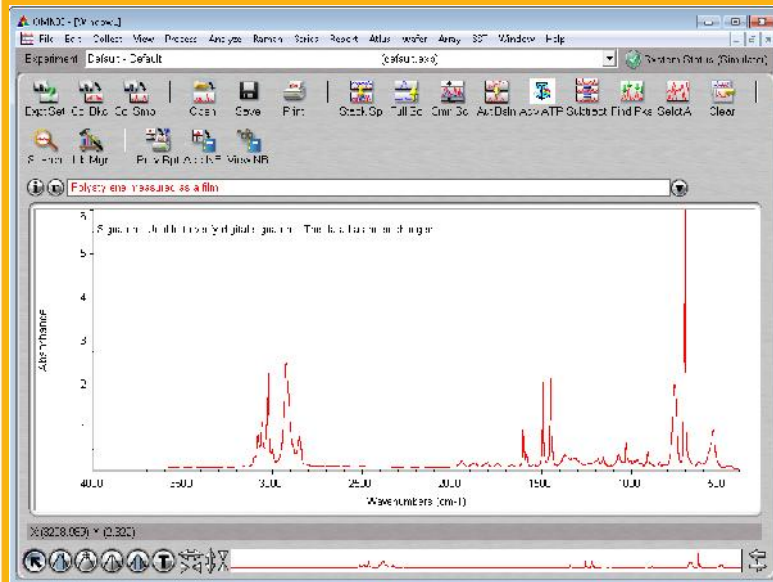
- Large spectral display
- Recognizes .spa, .spg and .qnt files
- Similar processing capabilities (ATR correct, peak areas, etc...)
- Control key sequences for menu options
- Icon driven menu bar



SPECTRAL DISPLAY

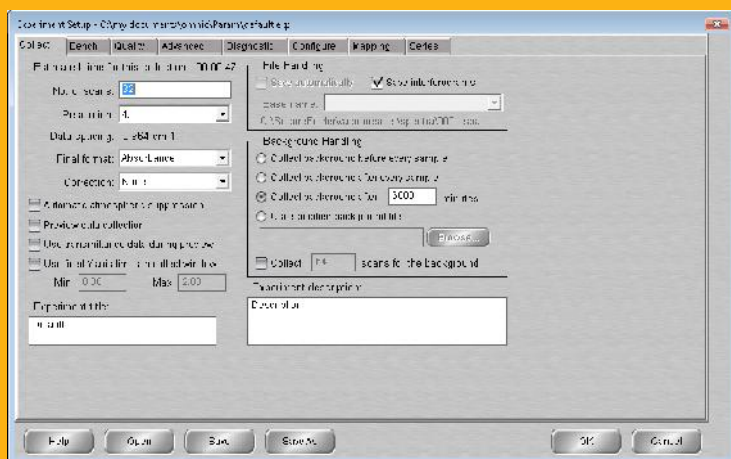
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Paradigm

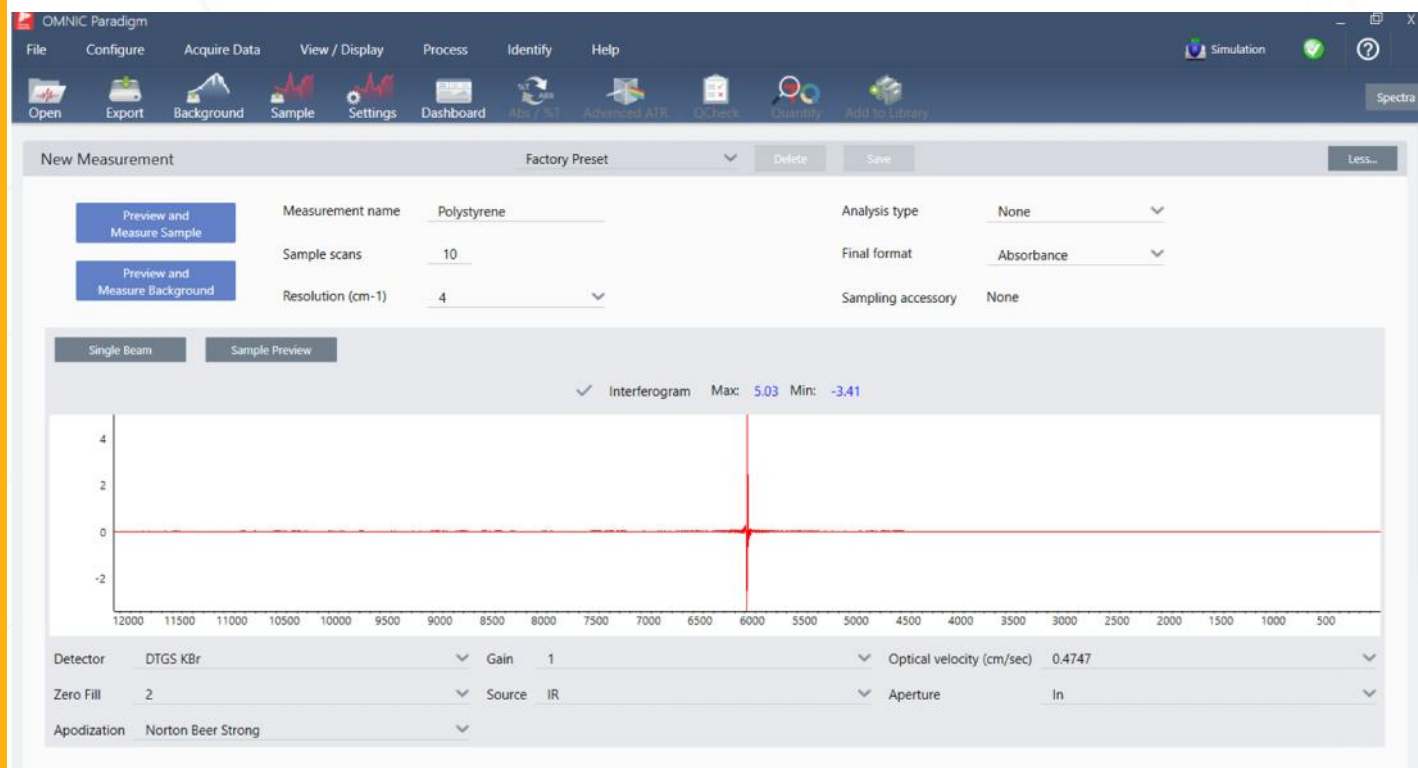


EXPERIMENT SETUP

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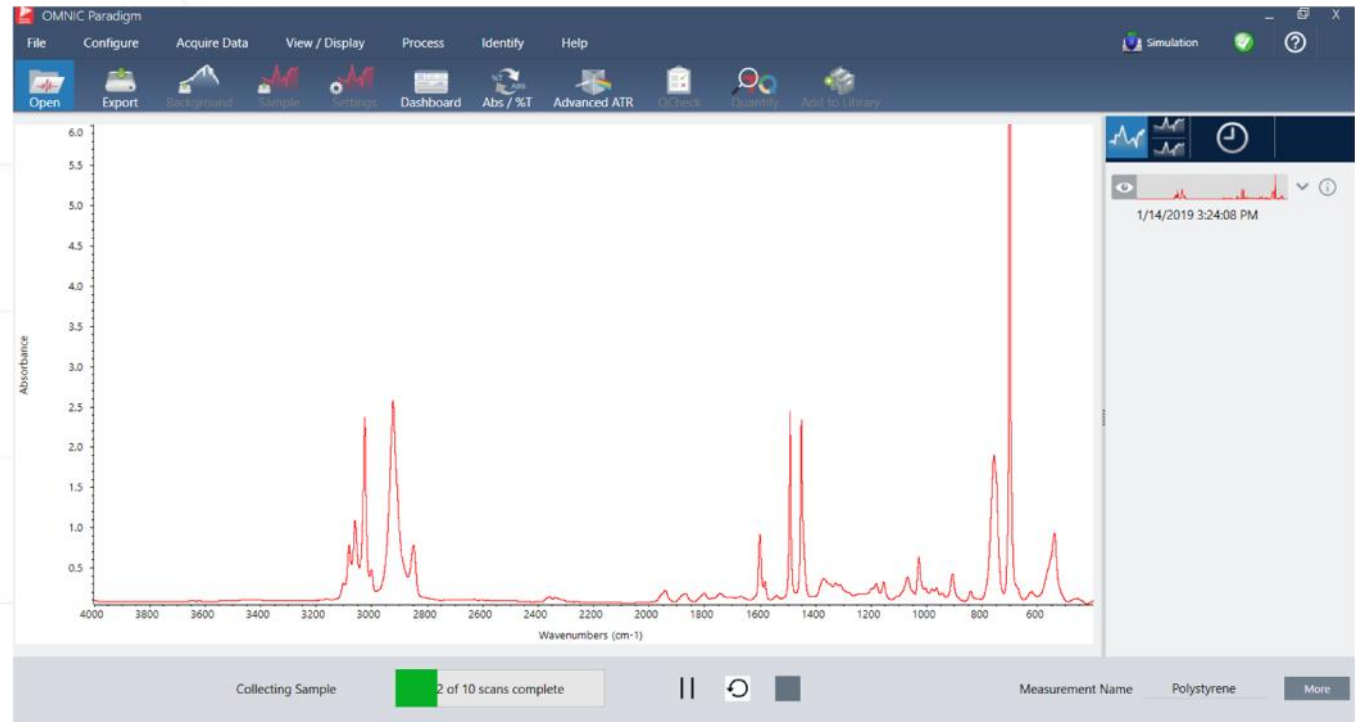
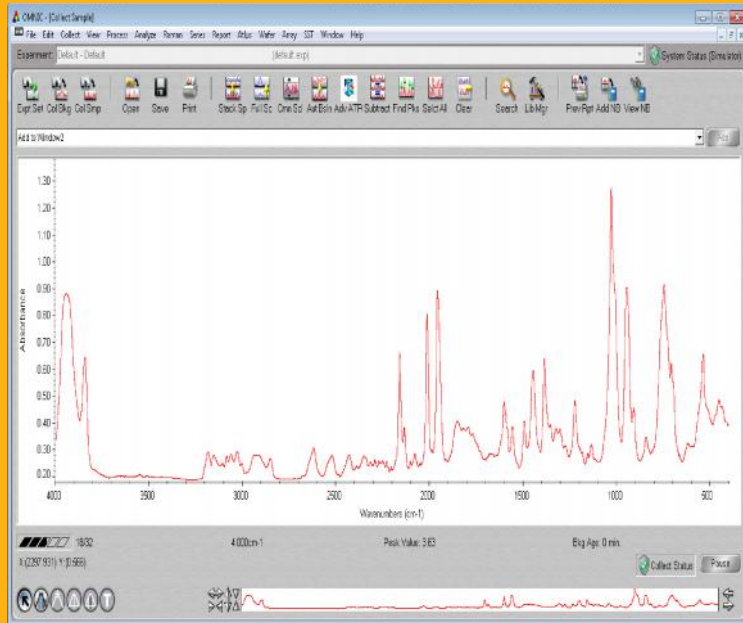
Paradigm



DATA COLLECTION

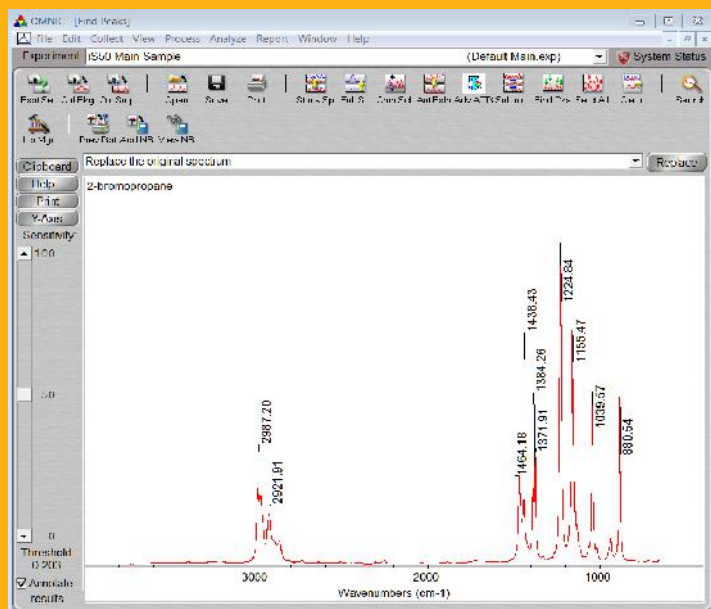
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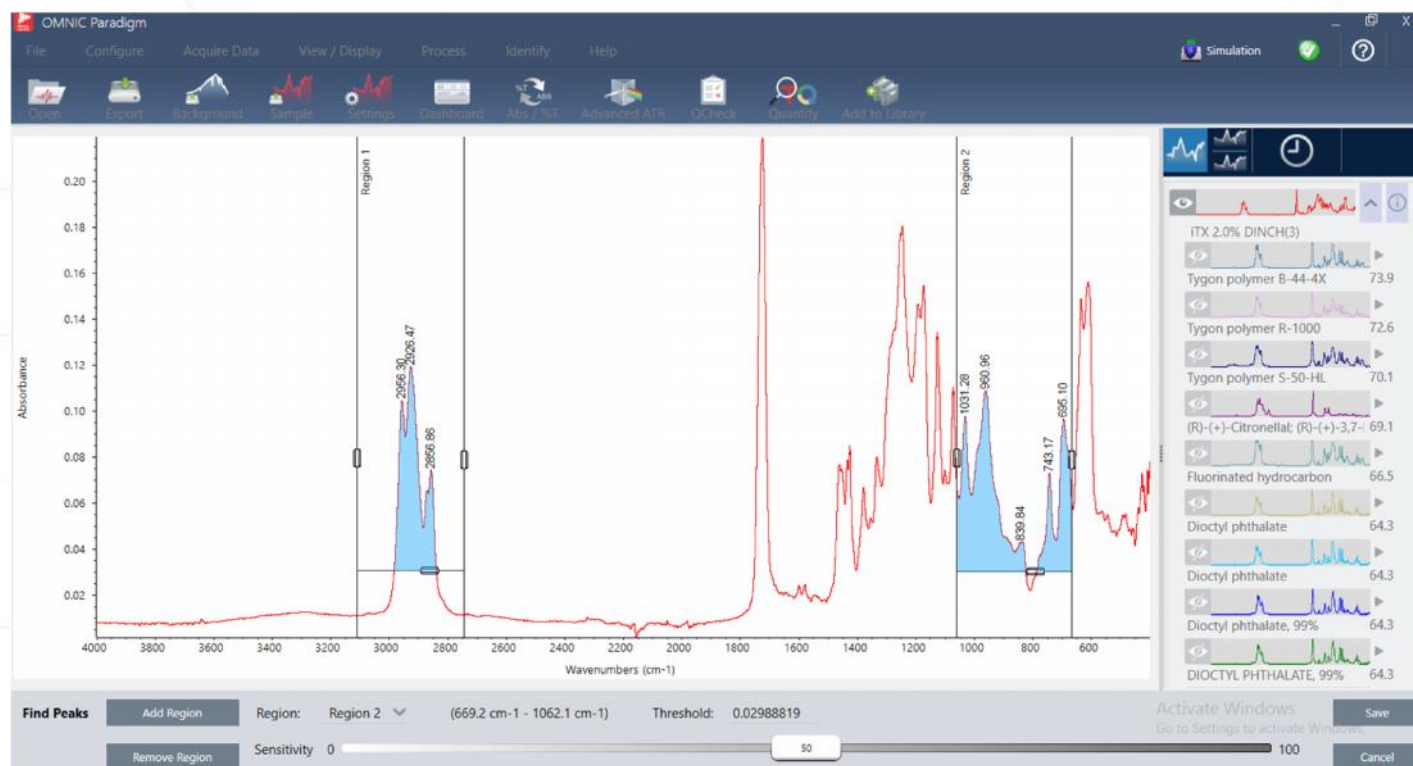


FIND PEAKS

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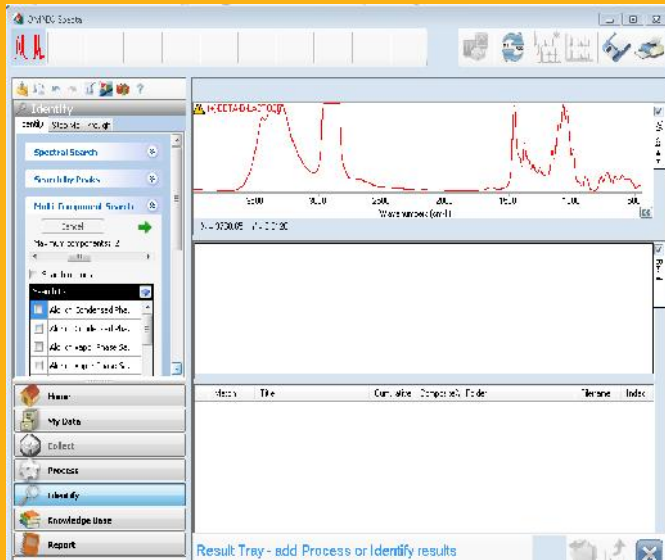
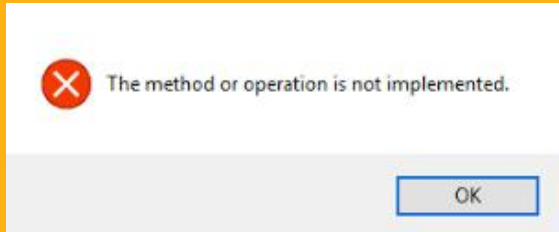


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MULTICOMPONENT SEARCH

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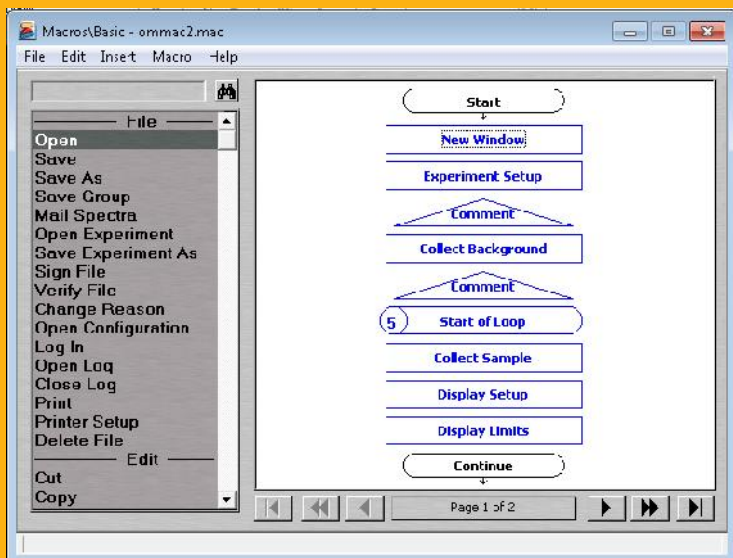
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Paradigm

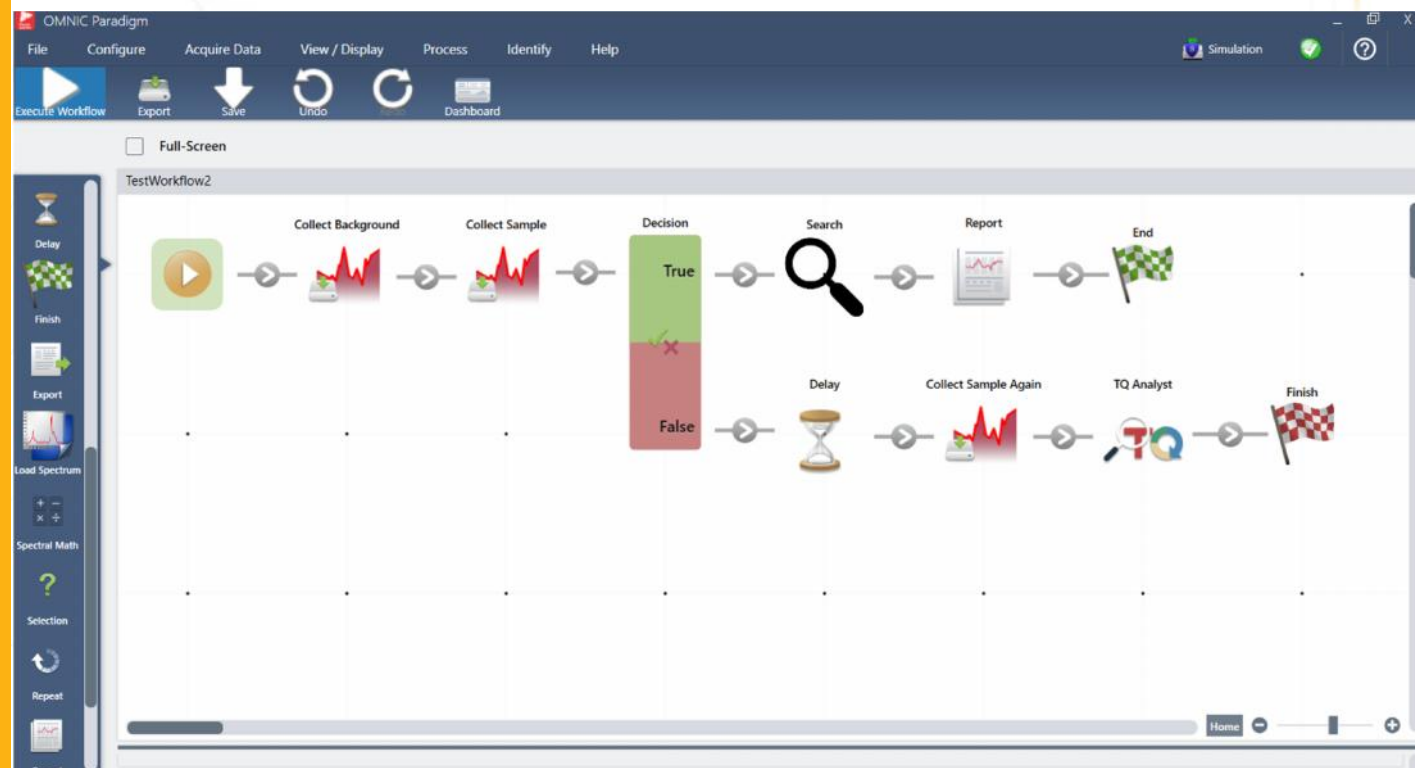


WORKFLOWS

Omnic



Paradigm



COMPLIANCE

Paradigm

- Database infrastructure
- MariaDB or other user selected database
- Improved audit trail with additional information

Security Administration

Security administrator control software

thermoscientific

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Audit Manager

Audit trail management

thermoscientific

TRANSMISSION QUALITATIVE ANALYSIS QUANTITATIVE ANALYSIS

The amount of IR light absorbed is proportional to sample absorbance, thickness and concentration

$$A = \epsilon lc$$

ϵ : absorptivity (freq. dependent)

l : path length

c : concentration



ATR FOR THE NICOLET SUMMIT

EVEREST ATR

- ZnSe Crystal
- Diamond
- Ge Crystal



iD5 ATR

- iD5 Diamond ATR
- iD5 ZnSe ATR
- iD5 Ge ATR
- Heated ZnSe Plate for iD5 (up to 130°C)
- Heated Ge Plate for iD5 (up to 130°C)

CONSERVAT IR

The ConservatIR external reflection accessory is designed to perform qualitative spectral analysis on large objects that do not fit inside the traditional sample compartment space. Designed for art conservators, this accessory can also analyze a variety of large objects such as automotive parts, toys, and fixtures.



BEFORE SUMMER HOLIDAYS

| | |
|--|---|
| Nicolet Summit FTIR Spectrometer LightBar | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6013257638001 |
| See the LightBar Feature in Action - Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6063878610001 |
| Introducing OMNIC Paradigm Software - Nicolet Summit Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6068220554001 |
| Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6043311984001 |
| Analyze Spectral Data Anywhere; Thermo Fisher Cloud | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6151730089001 |
| Air Chair Analysis with Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6089020013001 |
| QAQC Superheros - Melissa's Big Break | https://players.brightcove.net/665001591001/default_default/index.html?videoId=5786682420001 |
| Grilling Season with the Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6106687090001 |
| The Big One with the Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6125238087001 |
| One Pull Kenny with the Nicolet Summit FTIR Spectrometer | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6129205928001 |
| Summit FTIR Spectrometer - EPR Interview at Pittcon 2019 | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6024441941001 |
| Explore OMNIC Paradigm Software for Touchscreen | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6032722081001 |
| Get Started with the Summit Spectrometer and Desktop Monitor | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6032724475001 |
| Get Started with the Summit Spectrometer and Touchscreen Monitor | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6032724995001 |
| Explore OMNIC Paradigm Software for Desktop | https://players.brightcove.net/665001591001/default_default/index.html?videoId=6032722082001 |





ĎAKUJEM ZA POZORNOST