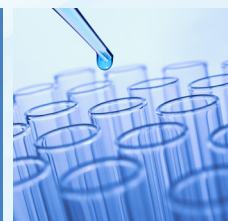
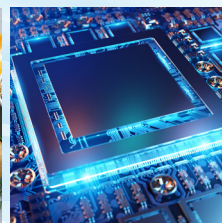
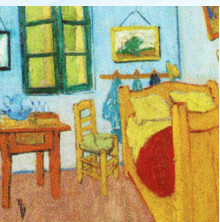


HORIBA

MacroRAM™

Benchtop Raman Spectrometer



Compact and Powerful
For Industry and Academia

macroraman.com

Explore the future

HORIBA

MacroRAM™

Benchtop Raman Spectrometer

The MacroRAM™ Raman spectrometer brings simplicity to Raman measurements without compromising the ability to handle even the most complex samples. Its compact and robust design makes it ideal for many environments, from undergraduate teaching labs to industrial QC applications.

Versatile Design

- Measure solids, liquids, powders and more
- Thermostatted cuvette holder available for temperature controlled measurements
- External fiber ports for probe-based measurements

Highly Sensitive

- Highest quality Raman filters
- Designed to optimize signal collection
- Back-illuminated NIR CCD cooled to -50° C for ultimate sensitivity



Simple and Safe

- Easy to install and use; *works right out of the box*
- Interlocked sample compartment for class 1 laser safety
- *Ideal for all environments from undergraduate labs to the factory floor*

Compact and Rugged

- Small footprint benchtop system
- Robust optical design
- Light enough to be moved from location to location

Intuitive and Powerful LabSpec 6 Software

- Full-featured industry-leading LabSpec 6 software
- Simple and intuitive interface for logical workflow
- Powerful data processing and analysis capabilities including multivariate analysis and database searching



MacroRAM for Education

MacroRAM Educational Labs

The MacroRAM™ Raman spectrometer is an ideal instrument for teaching Raman spectroscopy to undergraduate students. Its compact and robust design, including Class 1 laser safety, means it is safe for use in all undergraduate laboratories.

To facilitate the use of the MacroRAM in the undergraduate teaching laboratory setting, a series of educational labs were created. Designed to teach some of the most important concepts in Raman spectroscopy, such as identification, quantification, and vibrational chemistry, these educational labs can be used as is, or tailored to fit the needs of any undergraduate laboratory.

For more information and to see the available labs, go to:
horiba.com/educational/macroram

Testimonial:

"I taught a course this past winter term on Raman spectroscopy, and we were able to use the MacroRAM. The instrument is working great...I particularly like the LabSpec 6 software and the ability to do all of the analysis on the spectra. I appreciate the teaching materials."

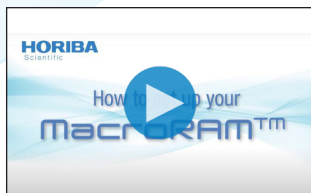
Prof. Dan Morris, Rose-Hulman Institute of Technology

Videos & Webinars

To view these videos visit macroraman.com



Introduction to the MacroRAM



How to set up the MacroRAM



MacroRAM
Accessories and Probes



Applications in Macroscopic
Raman spectroscopy:
From Industrial QC to Teaching Labs

Raman Academy

Raman Academy offers customized instruction and training designed for your needs, either online or in one of HORIBA's state-of-the-art labs.

Raman Academy gives you access to a full suite of tutorials, FAQs, video demonstrations, Tips & Tricks, on demand webinars, and more!

For more information go to:

RamanAcademy.com

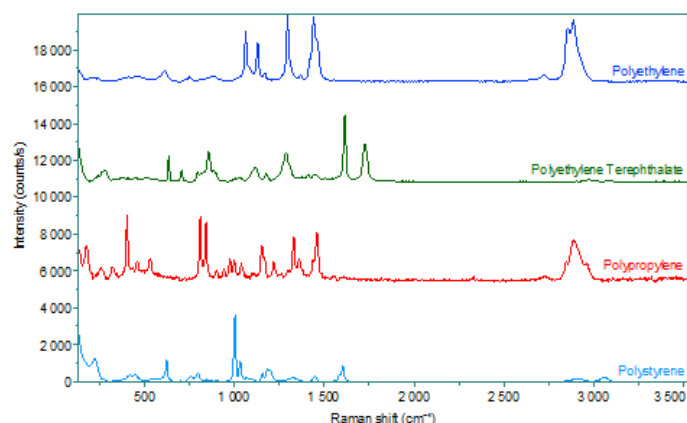


Applications

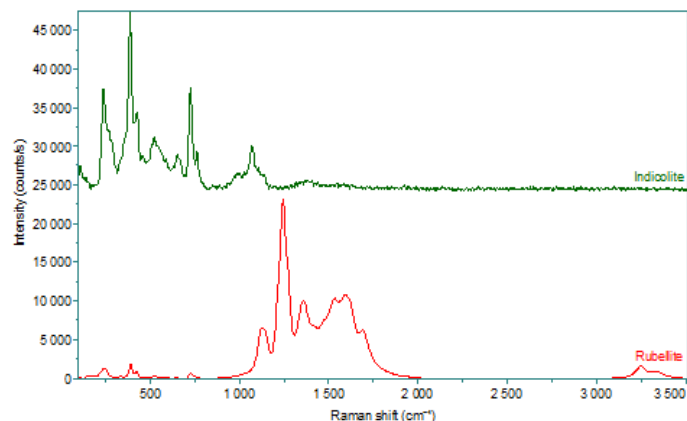
Pharmaceuticals • Cosmetics • Geology • Environment • Life Sciences • Polymers
Energy • Nanomaterials • Agro-food • Forensics • Art

Identification/Differentiation

Macroscopic Raman spectroscopy is an ideal technique for identification and differentiation of various materials.



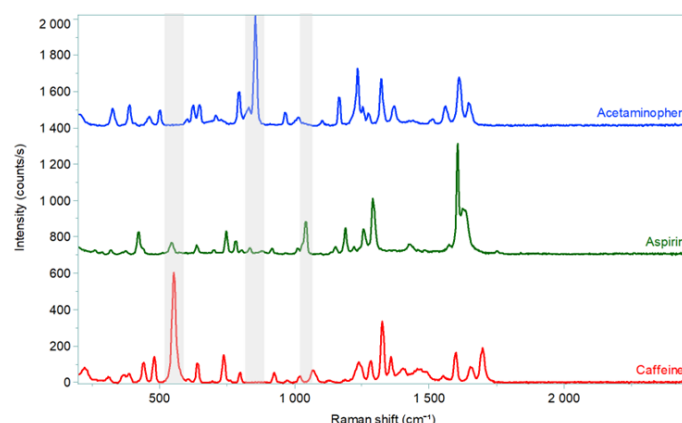
Raman spectra of various polymers



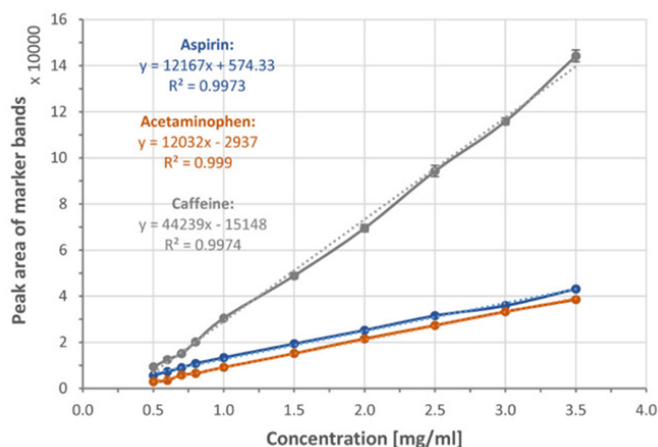
Raman spectra of indicolite and rubellite, both forms of tourmaline.

Quantification

Macroscopic Raman spectroscopy can be used to create calibration curves for accurate quantification.



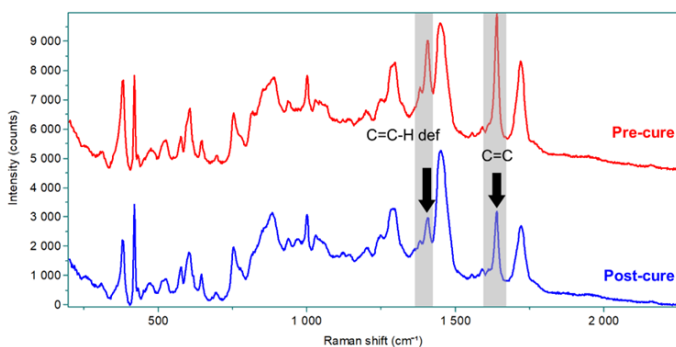
Raman spectra of API's present in Excedrin®. The intensity of the highlighted bands can be tracked as a function of known concentration to create a calibration curve for each API, as shown below. The resulting calibration curve can be used to accurately determine unknown concentration of each API.





Kinetic Measurements

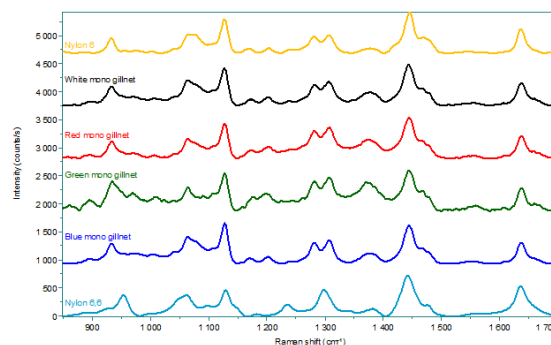
The MacroRAM allows for measurements as a function of time in order to monitor reaction kinetics.



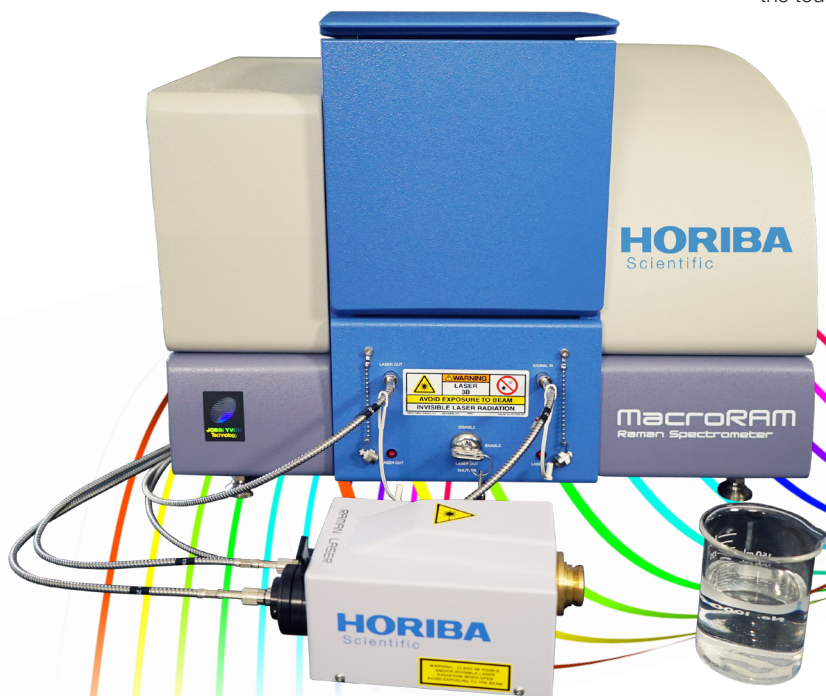
Raman spectra of pre vs. post cure for a polymerization reaction. The highlighted bands can be tracked over time to give insight into the kinetics of the reaction.

External Probe Measurements

External probes, including the non-contact SuperHead and touch/immersion probes, allow for fast and easy measurements, as well as measurements of large objects, directly in liquids/gels, or through containers.



Raman spectra of various fishing net fibers (microplastics) measured with the touch probe.





LabSpec 6

Spectroscopy suite

HORIBA Scientific's LabSpec 6 Spectroscopy Suite provides an intuitive and powerful software platform for Raman spectroscopy. It offers complete and versatile functionality for spectral acquisition, data processing, analysis, and reporting. In addition, LabSpec 6 provides various automation and customization options, along with security features, such as 21 CFR Part 11 compliance.

Spectral Acquisition

Easy, one-click spectral acquisition!



Acquisition

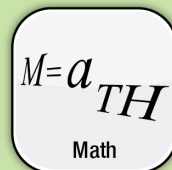
Data Processing



Real-time on-the-fly fluorescence backgrounds removal

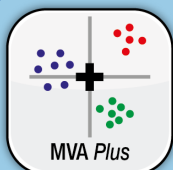


Custom baseline, smoothing, normalization, thresholding and more



Allows mathematical operations to be applied for spectral data manipulation

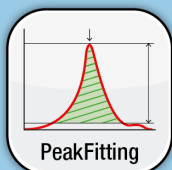
Analysis



Multivariate algorithms (PCA, MCR, HCA and K-means, CLS) for a quantitative and qualitative data analysis



Complete and automated spectral identification, mixture analysis and data mining



Custom or automatic peak-fitting for quantitative analysis

Reporting

Customizable templates for data reporting



CustomReport

Results

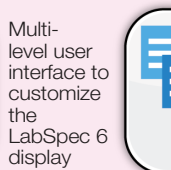
Automation & Customization



Fast processing of multiple data files



Custom GUI



Methods

Record routines to allow for automatic data acquisition, processing, analysis and more



Script ActiveX

Programming capabilities for instrument control and data processing

Compliance, Validation & Security



Validated

Tested and documented functionality and performance



UserAccounts

User access control and interface adaptation within multi-user environments

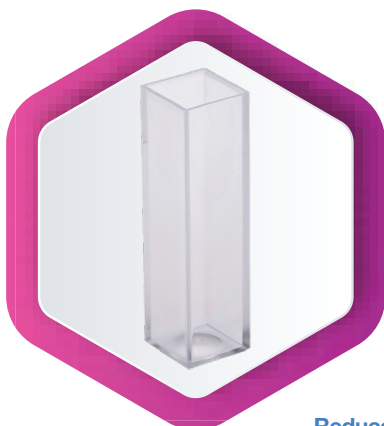


ProtectionPlus

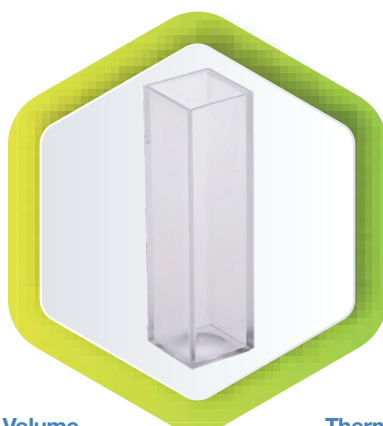
21CFR Part 11 compliant

Accessories

Quartz and Fused
Silica Cuvettes



Reference
Polystyrene Cuvette



HPLC Flow Cell



Reduced Volume
Cuvette and Adapter



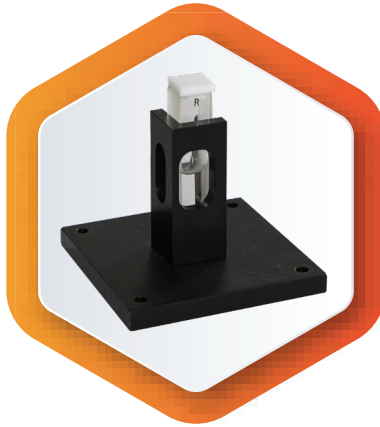
Thermostatted
Cuvette Holder



Solid Sample Holder



Cuvette Holder



Temperature Bath



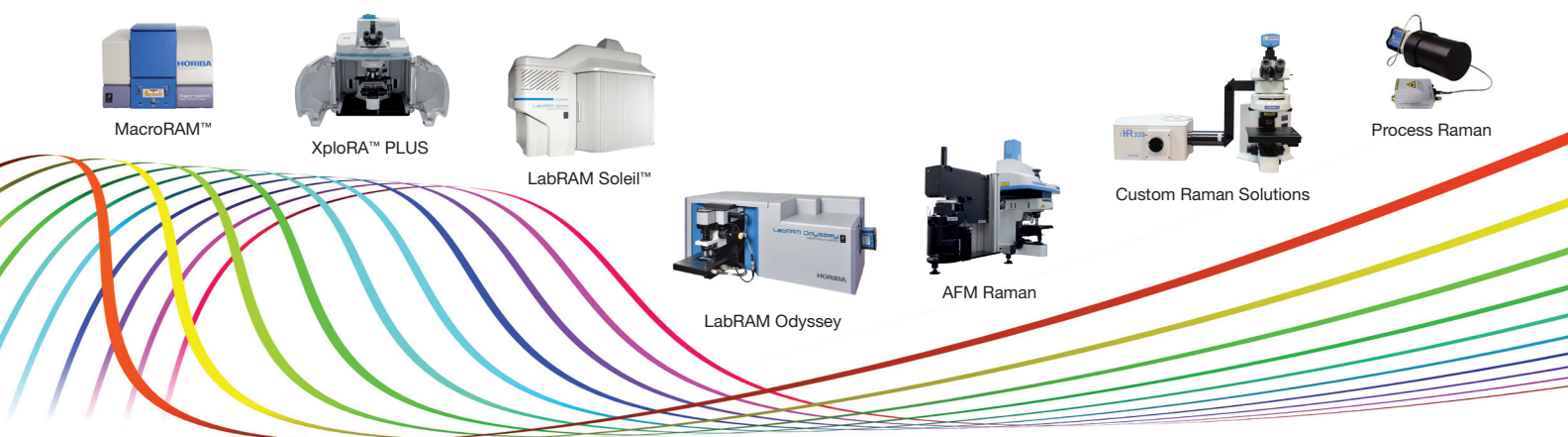
SuperHead



Specifications

| | |
|---|--|
| Laser Wavelength | 785 nm |
| Laser Power | Up to 450 mW (continuously variable under software control) |
| Spectral Range | 100 to 3400 cm ⁻¹ |
| Spectral Resolution | 8 cm ⁻¹ at 914 nm (Stokes) |
| Detection | Back-illuminated NIR CCD, cooled to -50°C, 80% QE at 800 nm |
| CCD Dark Current | 0.05 e ⁻ /pixel/second (-50°C) |
| Dynamic Range | 55,500:1 |
| Fiber Ports | Core diameter 100 µm, female FC/PC termination on housing |
| Fiber Ports (Numerical Aperture) | 0.22 |
| Safety | Class 1 internal sample compartment; Class 3B, external laser output port. Fully interlocked sample compartment with remote key switch to activate external laser output port. |
| Sample Handling, Internal | Cuvette and solid sample holders (standard); other accessories available |
| Sample Handling, External | Optional fiber probe for various external samples for various remote Raman measurements. |
| Dimensions (W x D x H) | 17 x 17 x 15 inches (432 x 432 x 381 mm) |
| Weight | 45 lbs. (20.4 Kg) |

Raman Family of Instruments



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