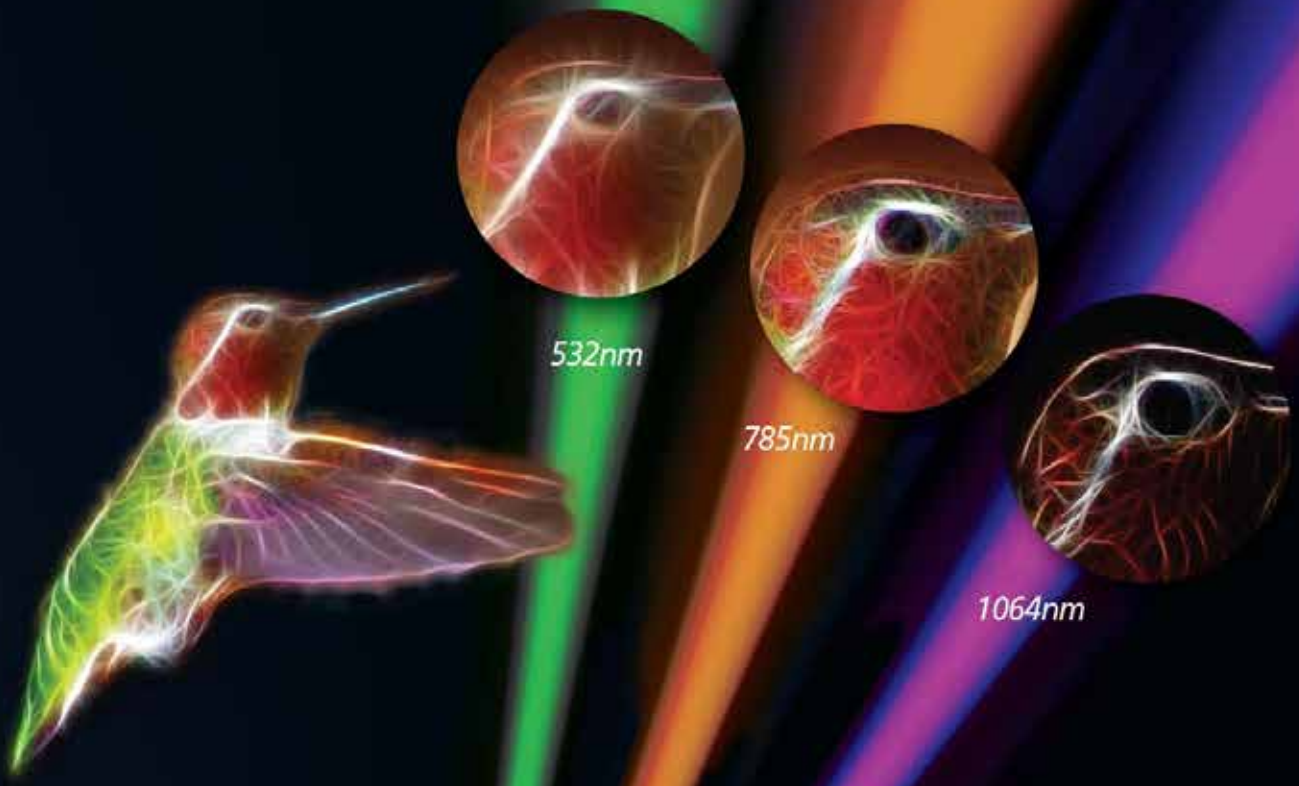
Nomadic™ Raman Microscopes

BaySpec
Pervasive Spectroscopy

1101 McKay Dr., San Jose, CA 95131 | (408) 512-5928 | www.bayspec.com

Nomadic™

The only confocal Raman microscope with VIS-NIR excitations (532, 785 and 1064 nm) simultaneously in one simple platform



Nomadic™– three wavelength confocal Raman microscope offers the best solution for the most challenging analysis

- Three laser on same spot with automatic laser switching
- High spectral and spatial resolution achieved by confocal optics and highly efficient and reliable VPG®-based spectrograph
- Ultimate fluorescence suppression for real-world samples

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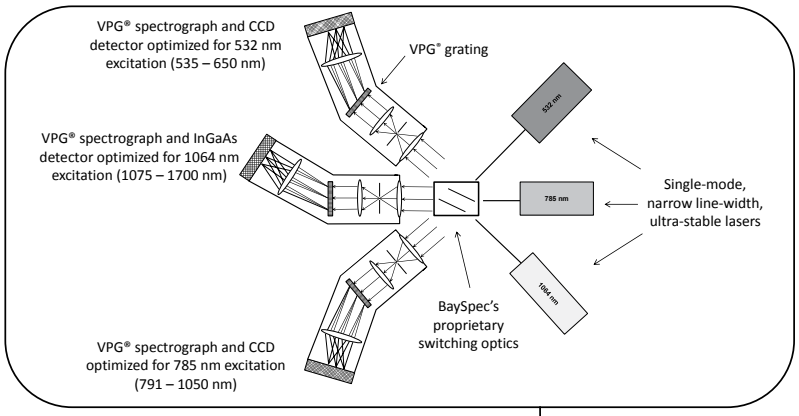
New Wave

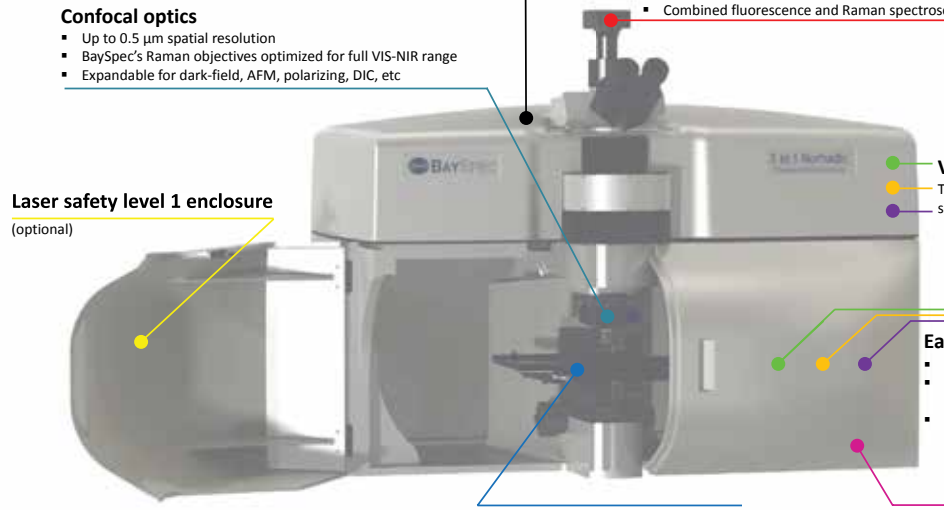


Compact, not compromised

In ***Nomadic***™, each excitation laser has its own dedicated VPG®-based spectrograph and highly-sensitive, deep-cooed detector, guaranteeing its performance, reliability and repeatability.

Research-grade camera
- Low dark noise, high-resolution, high frame rate
- Epi/trans fluorescence and brightfield imaging
- Combined fluorescence and Raman spectroscopy

Confocal optics
- Up to 0.5 µm spatial resolution
- BaySpec's Raman objectives optimized for full VIS-NIR range
- Expandable for dark-field, AFM, polarizing, DIC, etc



Laser safety level 1 enclosure
(optional)

VIS and NIR Raman in one
Three independent sets of dedicated laser, spectrograph and deep-cooled detectors

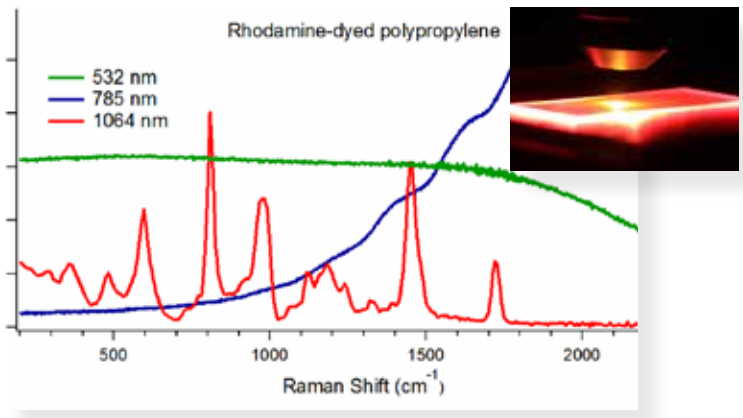
Easy laser switching
- Three lasers on same sample spot
- Push buttons and interlocks for additional laser safety
- Laser power adjustable by software

Automatic XYZ mapping stage
- Up to 0.1 µm step (Piezo stage optional)
- Auto-focusing optional
- Inserts for slides, petridishs, wellplates optional
- Cooling/heating, micro-incubation, microfluidics chambers optional

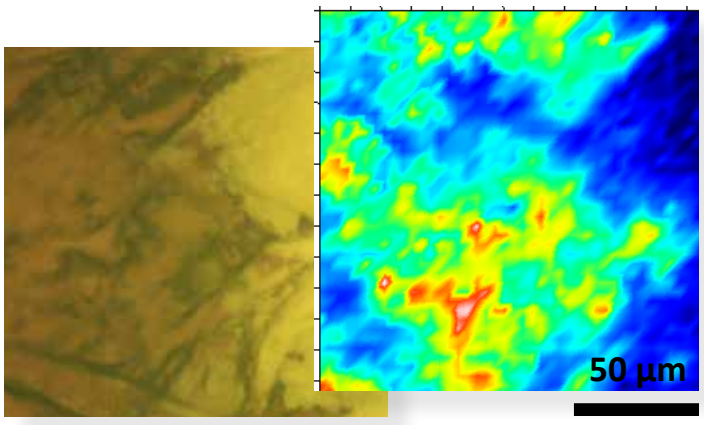
Spec20/20 software suite
- Automatic instrument control
- Automatic spectral correction (Baseline and background)
- Multivariate statistical analyses

Ultimate solutions for fluorescence suppression

BaySpec's dispersive 1064-nm Raman technology with deep-cooled InGaAs detectors and highly efficient proprietary VPG® grating technology delivers unmatched sensitivity, speed, and the advantages of confocal Raman micro-spectroscopy for the samples with fluorescence.

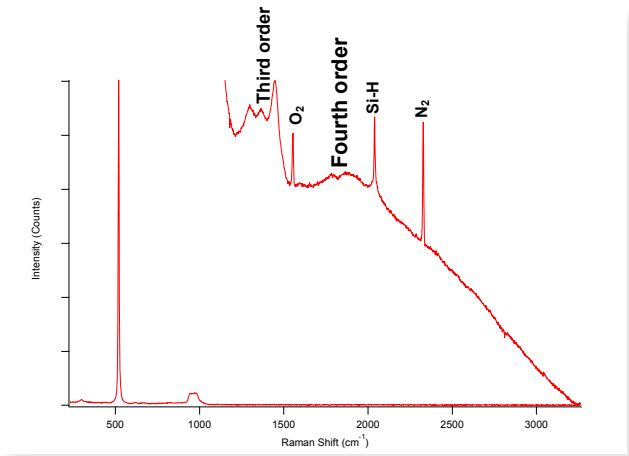


Three lasers on same spot, and **ultimate fluorescence suppression** by 1064 dispersive Raman, expands the scope to extensive real-world samples.



Chemical analysis and classification of black ink on paper (an important forensic application), only possible with 1064 dispersive Raman as inks are highly fluorescent

Performance



The exceptional sensitivity of ***Nomadic***™ is testified by the 3rd and 4th order of the Si in its spectrum.

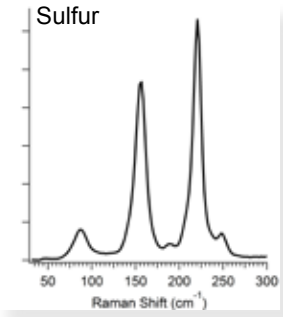
Sensitivity, speed, flexibility and versatility

BaySpec's ***Nomadic***™ is the only dispersive Raman microscope available today on the market simultaneously equipped with three laser excitations from the visible to the near-infrared (532, 785, and 1064-nm, or custom). With multi-laser ***Nomadic***™, there is no more need to test the sample on different Raman platforms. The exactly same location on a sample can be investigated with three different lasers automated switched by a click of button.

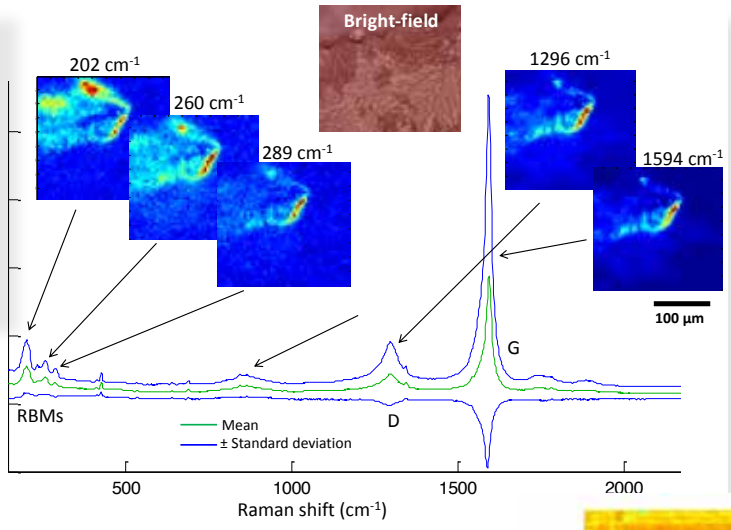
This research-grade Raman microscope offers unmatched sensitivity, speed, flexibility and versatility via highly efficient, proprietary volume phase gratings (VPG®) and highly-sensitive, deep-cooled CCD and InGaAs detectors covering full spectral range from the visible to the near-infrared. The ***Nomadic***™ is the ultimate tool for the most challenging Raman analyses in biomedical research, pharmaceutical, material characterization, and forensic science.

"one-shot" Raman spectra from <100 cm^{-1} to 3200 cm^{-1}, with 4 cm^{-1} resolution

Nomadic™ produces "one-shot" Raman spectra from as low as 30 cm^{-1} to 3200 cm^{-1}, with 4 cm^{-1} resolution in a single acquisition. No more scanning, stitching, and waiting needed.



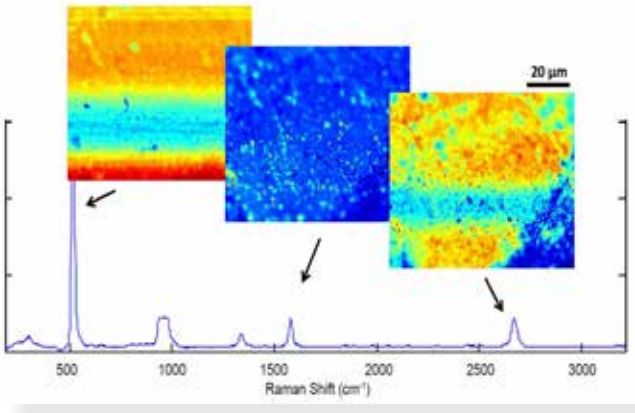
Sulfur Raman spectrum starts from low wavenumbers.



Chemical images of a complex carbon nanotube sample. RBM (radial breathing mode) region in low wavenumbers are important in characterization of carbon nanotubes.

Chemical-specific Raman Imaging

Nomadic™ enables chemical imaging without sample preparation. Differences in chemical composition and structure on a sample can be vividly revealed automatically – features that are often completely invisible in optical imaging. With three wavelengths, chemical imaging is enabled for samples that are previously unattainable by Raman.



Chemical images of graphene on silicon substrate. Images are reconstructed using silicon and graphene's Raman markers.

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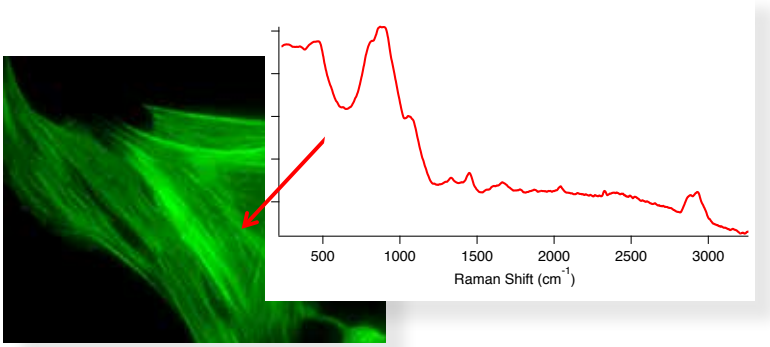
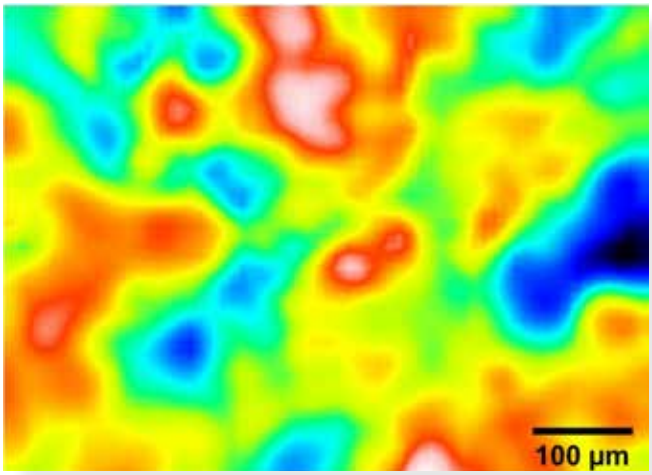
Vision



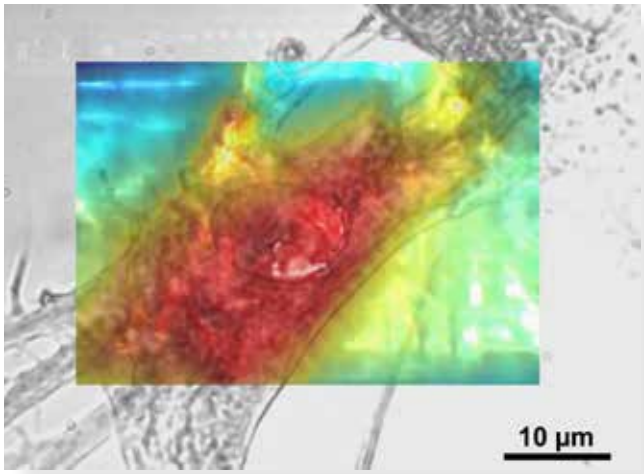
Muntjac skin fibroblast cells labeled with Alexa Fluor 488 phalloidin, Alexa Fluor 555 goat anti-mouse IgG, and TO-PRO-3 stain, imaged by ***Nomadic***™ with a blue LED light. Raman spectrum was taken with 1064 nm laser excitation.

Combined fluorescence and Raman imaging

With 1064 nm dispersive Raman technology, and a research-grade florescent camera equipped, both Raman and fluorescence imaging can be taken together from a sample fluorescently stained.



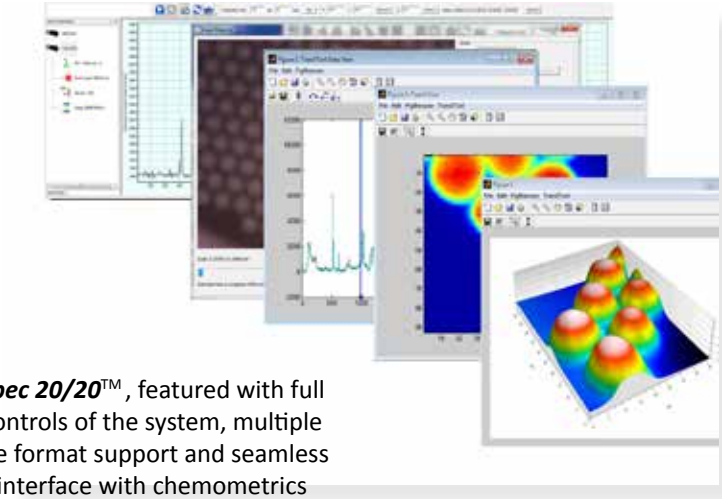
Active pharmaceutical ingredient (API) Raman mapping. ***Nomadic***™ is a powerful tool in pharmaceuticals.



Raman mapping of a human cell provides direct biochemical information (color image reconstructed using a lipid Raman marker).

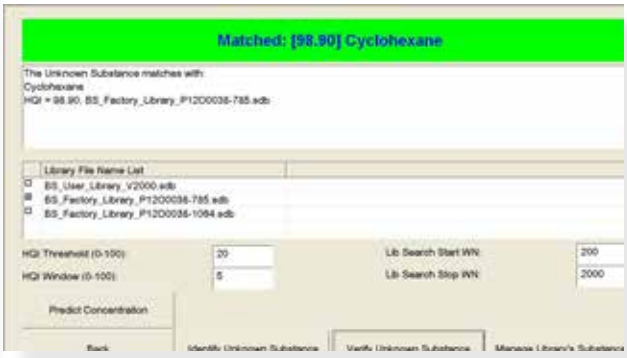
Powerful Spec20/20™ software suite

Nomadic™ is a fully software-operated system. Along with powerful spectral acquisition and processing functions, the Spec20/20 imaging software is integrated with spectral library, and chemometrics software for analysis such as PCA and MCR, enabling both easy measurements and practical data display/manipulation in seconds.



Spec 20/20™, featured with full controls of the system, multiple file format support and seamless interface with chemometrics software.

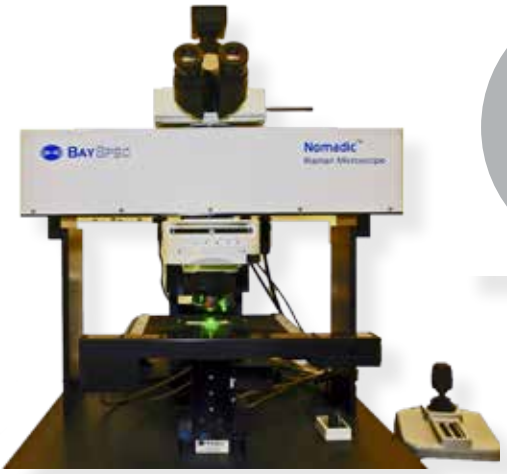
Spec 20/20™'s library search interface



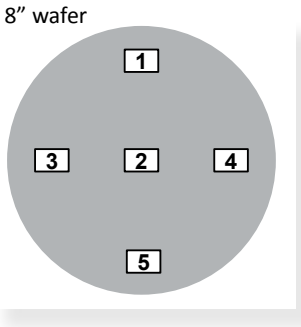
Versatility

Flexible configuration

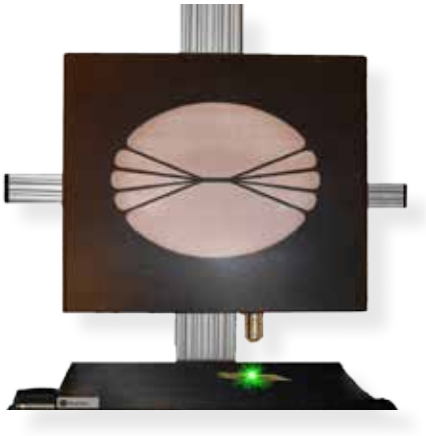
The ***Nomadic***™ is also available in single or dual wavelengths with optional large-format mapping stages (up to 12 inches). With regional mapping features, it can automatically analyze many pre-defined regions on a large sample with a click of button.



Nomadic™ single-wavelength with large-format stage, designed for wafer industry.



An example of regional mapping feature for a 8” wafer with 5 sites



Nomadic™ OEM module

The core of the ***Nomadic***™ confocal Raman microscopes can be configured to a compact, ruggedized, stand-alone unit to achieve the major functions of the ***Nomadic***™ Raman microscopes. It allows easy integrations to systems requiring flexible yet high-quality confocal Raman microscopy measurement. Equipped with an excitation of 532, 785 or 1064 nm (or custom), it delivers unprecedented power and flexibility for a great variety of demands, such as rapid and nondestructive on-line analysis and diagnostics in chemistry, pharmaceuticals, biology, material science and geology fields.

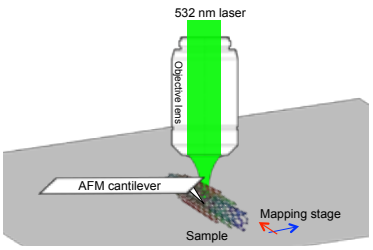
Side view

Open platform for endless possibilities

Nomadic™ is build on a research-grade microscope but not occupying the microscope. It guarantees easy and cost effective upgrade and custom-build possibilities, such as incorporation of numerous microscopic techniques into a multi-channel system to meet individual customer’s needs.

Liquid nitrogen cooling sample stage

Dark-field Rayleigh scattering spectroscopy



AFM Raman microscopy

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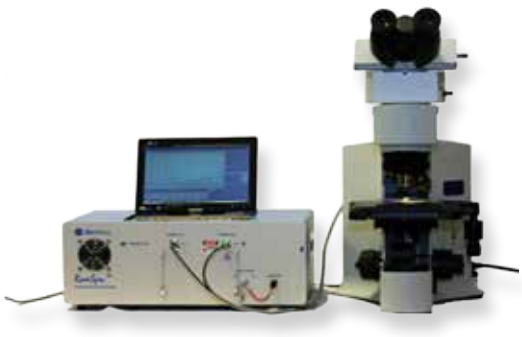
Specifications

	Specifications		
MICROSCOPE			
Base	Upright Olympus BX51, or Nikon Eclipse, or custom		
Objectives	5 position turret with any objective compatible		
Camera	1392 X 1040 color CCD, up to 22 fps		
Stage	Multi-Axis stage fully software-controlled		
Stage Movement	75 mm X 50 mm travel range (long-range optional) with 0.1 µm (20 nm optional) steps		
SIZE	**3-wavelength**	**Single-wavelength**	
Dimensions	915 mm (L) X 620 mm (W) X 762 mm (H) (36 in X 24 in X 30 in)	610 mm (L) X 610 mm (W) X 762 mm (H) (24 in X 24 in X 30 in)	
Weight	68 Kg (150 lbs)	37 Kg (80 lbs)	
OPTICS			
Laser Wavelength*	532 nm	785 nm	1064 nm
Laser Power (Adjustable)	100 mW	100 mW	500 mW
Laser Switch	Push-button switch, software switch, eyepiece interlock		
Spectrograph	f/2; Transmission *Volume Phase Grating (VPG)*•		
Spectral Range*	100 - 3200 cm^{-1}	100 - 3200 cm^{-1}	200-1800 cm^{-1}
Spectral Resolution	4-5 cm^{-1}	4-5 cm^{-1}	6-8 cm^{-1}
High-Resolution Option	2 cm^{-1}	2 cm^{-1}	4 cm^{-1}
Spatial Resolution	up to 0.5 µm	up to 1 µm	up to 2 µm
DETECTOR			
Type	TE cooled CCD	TE cooled CCD	TE cooled InGaAs
Cooling	-55 °C	-55 °C	-55 °C
Number of Pixels	2048 × 64	2048 × 64	512
Pixel Size	14 µm	14 µm	25 µm
Max. Integration Time	600 sec.	600 sec.	60 sec.
Digitized Output	16-bit		
ELECTRONICS			
Interface	USB 2.0		
Input Voltage	110 to 220 V AC		
Power Consumption	< 200 W		
SOFTWARE			
GUI	Spec 20/20 for Windows XP/Vista/7		
SDK Option	DLL, sample codes for VC and LabVIEW		
Spectral Libraries	User built or 3rd party (optional)		
Chemometrics Tool	Eigenvector Solo+MIA (options available)		

*Custom laser wavelength and spectral range starting with low wavenumbers available upon request

MovingLab™, a ruggedized and battery-powered transportable Raman microscope is available for fast Raman micro-spectroscopy on the field.



Already have a microscope? We can retrofit any commercially available microscope with our Raman engines. Please contact us!

BaySpec's Raman Instrumentation

Nomadic™
The only Raman microscope on the market with three simultaneously equipped laser sources (532nm, 785nm and 1064nm). Customizable with automated stages, heating/cooling plates, objectives. Powerful Spec2020 mapping software included.

RamSpec™
Turn-key solutions designed for best-in-class performance and long-term reliability. Integrating ultra-sensitive, deep-cooled transmission spectrometers, an optional integrated computer and fiber connectivity. Ultra-high resolution versions available.

MovingLab™
Ideal for easy transport into the field or for mobile forensics work. It bundles an epi-illumination microscope with a BaySpec Raman spectrometer, laser source, video camera, and controlling computer into one space-saving footprint (~1 ft^2) weighing less than 20 pounds with an onboard battery. Available in 532nm, 785nm or 1064nm.

Agility™
The portable benchtop Raman spectrometer delivers high sensitivity and repeatability in an affordable, ruggedized, battery-operated package. Available in single or dual band options. An integrated sample compartment allows the utmost flexibility, via its quick-change, auto-aligning sample holders.

Nomadic™ ***OEM module***
The core of the ***Nomadic***™ microscope. It allows easy integrations to systems requiring flexible yet high-quality confocal Raman microscopy measurement.

BaySpec, Inc.

Founded in 1999 with 100% manufacturing in the USA (San Jose, California), is a vertically integrated spectral sensing company. The company designs, manufactures and markets advanced spectral instruments, from UV, Visible, Near Infrared, Raman, Hyperspectral Imaging spectrometers to OEM portable NIR and Raman bench-top and Raman microscope, for the forensics, biomedical, pharmaceuticals, chemical, food, semiconductor, homeland security, and the optical telecommunications industries.

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Contact info:

BaySpec, Inc.
1101 McKay Drive
San Jose, CA 95131
USA

Tel: +1 (408) 512-5928
Fax: +1 (408) 512-5929
Web: www.bayspec.com
email: sales@bayspec.com

All BaySpec products are made in the USA.