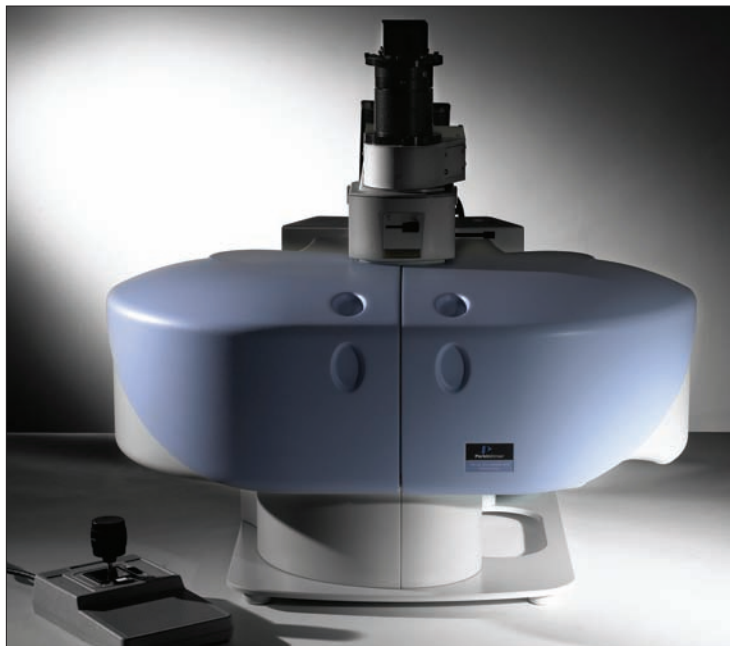


# RamanMicro 300

## Raman Microscope System



Raman spectroscopy offers a convenient spectroscopic method for the identification of materials and more detailed studies of their molecular structure. It can stand alone as a powerful and informative analytical technique or can give complementary information to that obtained from mid- and near-IR spectroscopy.

The PerkinElmer® RamanMicro™ 300 is a Raman microscope system designed to produce high quality Raman data from either physically small samples such as fibers and single crystals or from small areas of larger samples such as contamination on a surface. When fitted with the software-controlled motorized stage, it is also an ideal system for chemical imaging (the study of component distribution across the surface of a sample) or depth profiling.

### Key Features & Benefits

- ▶ Permanently aligned optics ensure that there is no requirement for user-alignment prior to analysis.
- ▶ High energy throughput of the microscope and optical benches ensures high quality data in a minimum of time. This is particularly important in sample imaging and high-throughput screening.
- ▶ Range of sampling stages and microscope objectives to cover the full range of potential samples.
- ▶ Optional enclosure to comply with Laser Class 1 regulations.
- ▶ Ability to choose the most appropriate spectrometer to match the requirements of the laboratory.
- ▶ Optional fiber probe for remote sampling and reaction monitoring.
- ▶ Comprehensive suite of software packages to simplify the full range of micro and macro Raman analyses.

The RamanMicro 300 is based on the research-grade Olympus® BX51 frame that has been equipped with a 100W halogen lamp and high quality video camera for sample positioning. The lens-centering nosepiece allows for considerable ease of use when moving between different objectives. This system provides both excellent visible and Raman data while maintaining a universally-accepted platform for additional microscope attachments.

The microscope can be configured with or without the optional laser-safe and light-proof enclosure.

### Choice of spectrometers and macro-sampling options

For micro-macro capability, the RamanMicro 300 can be linked to the RamanStation™ 400 sample compartment-based instrument (Figure 1). Its fiber optic capability means that the addition of a fiber optic probe can increase the configuration to a 3-in-1 system. For those laboratories mainly interested in a dedicated microscope, the RamanMicro 300 can be linked to a RamanFlex™ 400 spectrometer (Figure 2), which can also be fitted with a

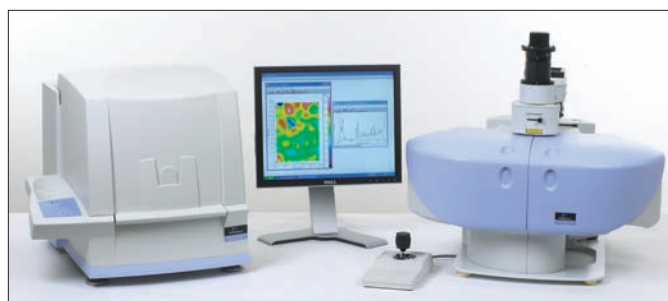


Figure 1. RamanMicro 300 shown here with RamanStation 400.



Figure 2. RamanMicro 300 shown here with RamanFlex 400.

probe. This choice of spectrometers gives the analyst the freedom to choose the best combination of spectrometer and microscope for their particular laboratory requirements.

Both the RamanStation 400 and RamanFlex 400 are based on the PerkinElmer unique, high resolution echelle spectrograph. Many spectrograph designs require time-consuming scan-and-stitch modes of data acquisition. Echelle spectrographs on the other hand use crossed gratings and high-end two-dimensional CCDs and, with no moving parts, are the only spectrographs capable of full spectral range coverage (95-3500  $\text{cm}^{-1}$ ) at high resolution (better than 4  $\text{cm}^{-1}$ ) in a single acquisition.

This unique rapid spectral acquisition at full range and high resolution is complemented by the RamanMicro 300's impressive optical efficiency. These features are particularly powerful when it comes to analysis of dynamic systems or mapping and generation of chemical images.

Whichever optical bench is chosen, the high energy throughput of the system ensures that high quality spectra are obtained even from the most challenging of samples.

### Range of sampling stages

The RamanMicro 300 is available with either a manual or motorized stage, capable of accommodating a full range of sample holders from microscope slides and petri dishes through to multi-well plates and tablet and powder holders (Figure 3). From simple analysis of a fiber on a glass slide through to high throughput screening, the RamanMicro 300 provides straightforward and efficient analyses.

The motorized stages are controlled both by a joystick and by the software. The joystick offers a convenient and rapid method for sample location and focusing whereas software control of the stage is vital for doing sample mapping, line scanning or multiple sample analyses.



Figure 3. A range of multi-well tablet and powder holders is ideal for the automated analyses of multiple samples in a busy pharmaceutical or industrial laboratory.

These stages also have a motorized Z (focus) control.

	Manual Stage	Motorized Stage
X-Travel	76 mm	114 mm
Y-Travel	52 mm	75 mm
Z-Travel	25 mm	25 mm
Accuracy	n/a	0.1 $\mu\text{m}$
Accept microscope slides	Yes	Yes
Accept tablet and powder holder	No	Yes
Accept multi-well plates	No	Yes

### Lens-centering nosepiece and objectives

The RamanMicro 300 is equipped with a lens-centering nosepiece and a range of objective lenses as standard. With a standard nosepiece there is a danger that, when selecting different objectives, the sample appears to move in the field of view and in extreme cases the sample may be “lost” all together. The lens-centering nosepiece allows the analyst to change objectives and hence zoom-in on the sample while avoiding lateral displacement in the field of view (Figure 4).

A range of standard objectives from x5 through to x100 is available as is a selection of long working distance objectives.

### Interlocked enclosure

A light-proof, fully interlocked enclosure is available which can be used to minimize spectral artifacts caused by room lights or sunlight. It also renders the instrument Class 1 laser safe. When the enclosure is closed, the

microscope’s Z-axis focus control is still accessible for real time sample focusing and optimum Raman spectra collection.

### The benefits of adding a Raman fiber probe to the system

An optional Raman fiber probe can be added to all the above spectrometers, greatly increasing their sampling flexibility. When a probe is added to the RamanFlex 400, the system expands from being a high performance microscope to a system capable of remote macro sampling or reaction monitoring studies.

The RamanStation 400 already has a versatile, motorized stage for macro sampling but the addition of a probe simply makes it the most versatile sampling system available: detailed macro analyses can be carried out in the sampling area; remote sampling or reaction monitoring is available via the probe, while the RamanMicro 300 adds micro sample analysis or micro-mapping of larger samples.

A range of standard and triggered probes is available (Figure 5), plus higher pressure and temperature probes can be supplied for more demanding reaction monitoring. The standard fiber length is 5 meters but longer fibers are available.



Figure 5. A range of standard and triggered probes is available.

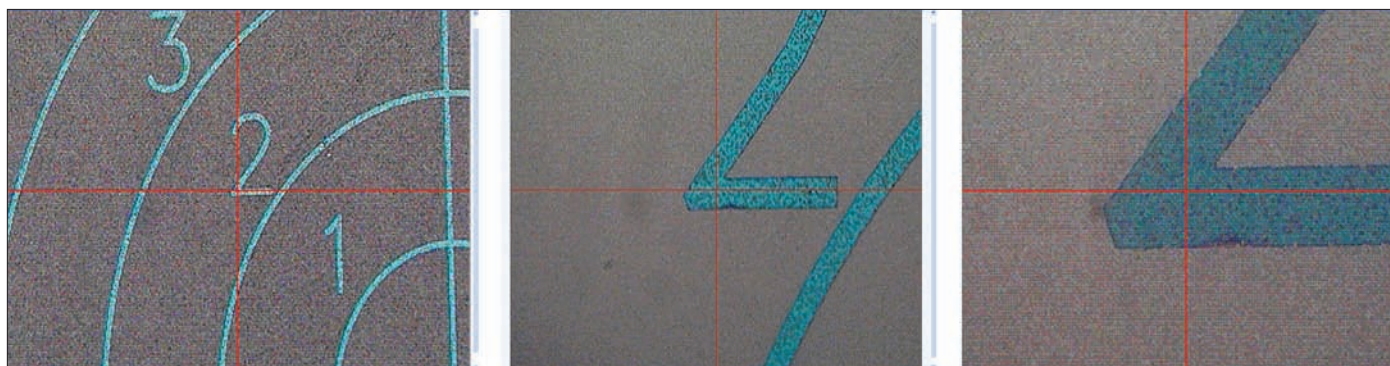


Figure 4. x5, x20 and x50 visible images taken with lens-centering nosepiece.

## Integrated software packages to cover all application requirements

A complete suite of data collection and processing software is available to simplify analyses from straightforward single point measurements to sample imaging through to reaction monitoring and sophisticated chemometric quantitative analyses.

The PerkinElmer Spectrum™ Software package allows easy control of the spectrometers and functions seamlessly with the other PerkinElmer software packages.

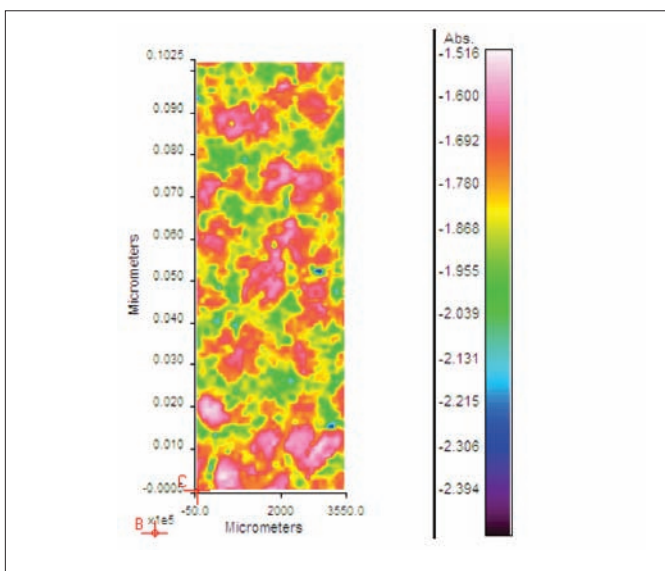


Figure 6. Image of total Raman intensity for pharmaceutical tablet.

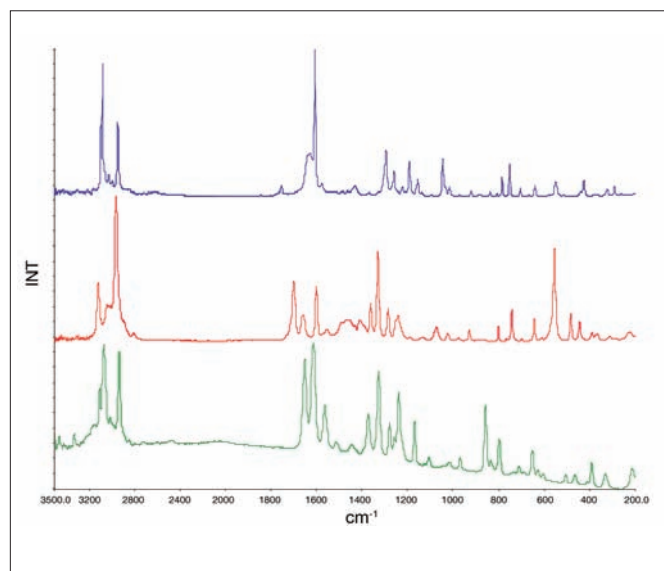


Figure 7. Spectra from the three tablet components from the image.

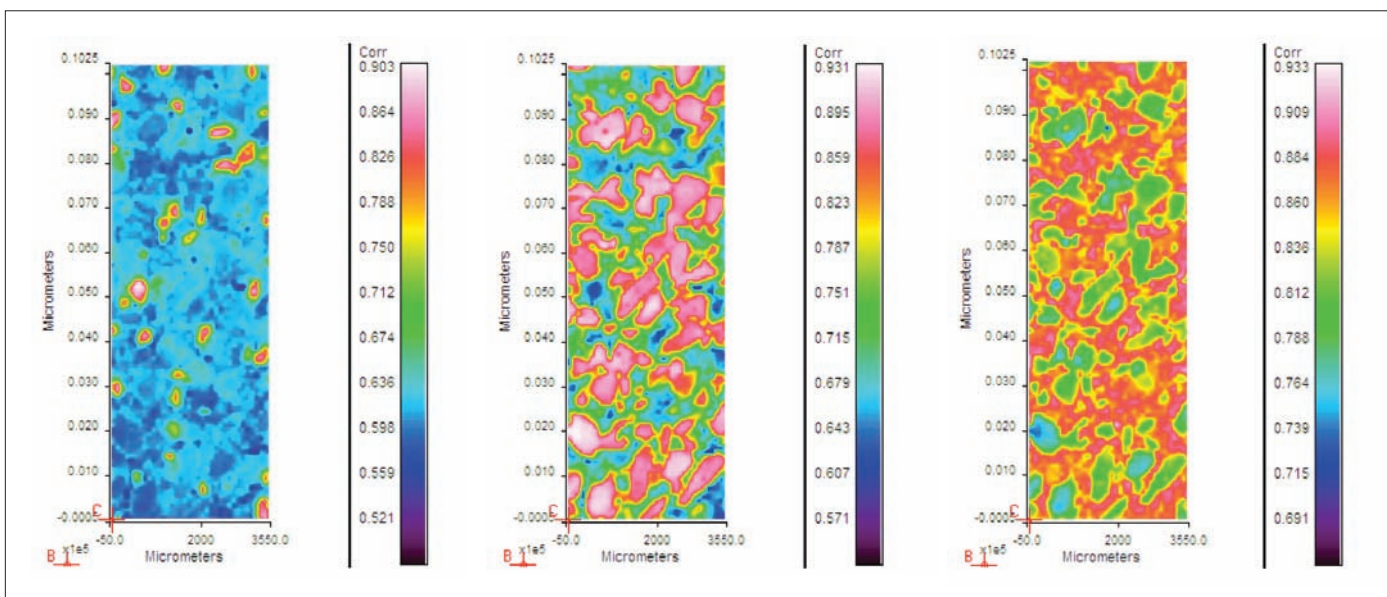


Figure 8. Component distribution images for the three components.

Spectrum Search comes as standard and allows the analyst to take a sample spectrum and search it against user-generated or commercially available libraries. Available libraries include those for narcotics, forensics, inorganics, minerals, pharmaceuticals and polymers.

For sample mapping on the motorized stage of the RamanMicro 300 or the RamanStation 400, SpectrumImage™ software allows full data collection and processing on the resultant images. Optimum chemical images can be generated with the click of a button using the unique 'show structure' function (Figures 6-8).

Spectrum Insight™ software is designed for convenient measurement of high throughput analyses (Figure 9) and reaction monitoring (Figure 10). It generates easy-to-interpret visual images of the large amounts of data that can be generated in these experiments.

Spectrum software allows spectral peak height and peak area measurements, but for more rigorous quantitative analyses, Quant+™, a quantitative chemometrics based package, is recommended. Chemometric models generated in Quant+ can be used for data analysis in Spectrum, SpectrumImage and SpectrumInsight.

### RamanMicro 300 key specifications when coupled with RamanStation 400 or RamanFlex 400

Laser:	785 nm with output of 250 mW
Range:	3500-95 cm <sup>-1</sup>
Spectral resolution:	4 cm <sup>-1</sup> FWHM, measured using the calcite band full width half maximum
Pixel resolution:	1 cm <sup>-1</sup>
Laser power at source:	80 mW, objective dependent
Minimum spot size:	10 micron laser spot size, when using 100x objective
Illumination source:	100 W halogen lamp with front installed intensity control dial
Microscope dimensions and weight when fitted with camera, light source and open enclosure:	760 mm x 700 mm x 560 mm (w x d x h) 25 Kg

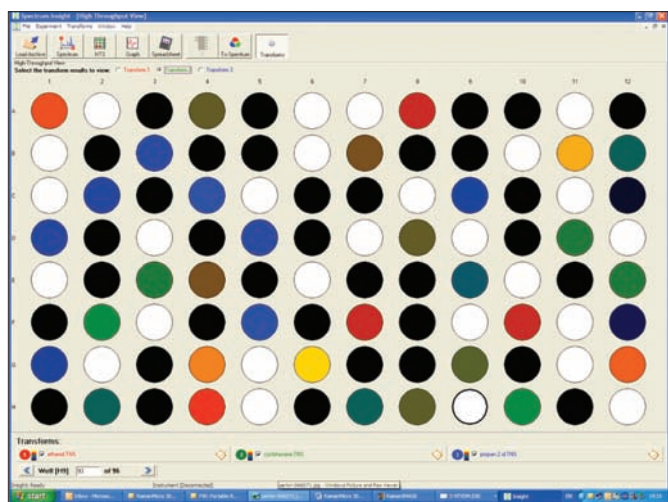


Figure 9. Multi-well plate where different colors are material specific.

### Application areas

- Industrial research and troubleshooting.
- Detailed analyses of sample homogeneity such as pharmaceutical tablets.
- Analysis of multilayer polymers (packaging) and polymer defects.
- Academic research and teaching (chemistry, chemical engineering, pharmacy, forensics, physics, geology, archaeology, etc).
- Material conservation (painting, wood, stone and metal surfaces, fabrics, etc).
- Forensic analysis of fibers, single crystals and other small particles. Analysis of explosives.
- Analysis of printing materials (paper, polymers, etc) and inks. Important for forensic and quality control troubleshooting.
- Analysis of biomaterial structures. Raman is particularly good for the study of tertiary structures. Also useful for the measurement of sample homogeneity.

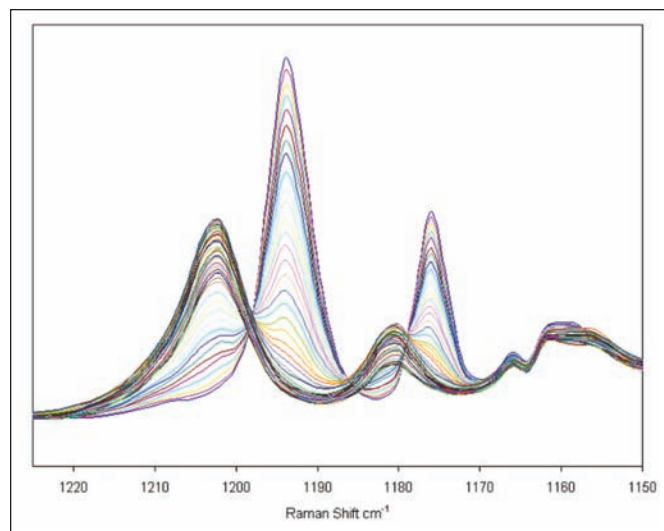


Figure 10. Zoom in on reaction monitoring data showing high resolution and quality of information.

**CLASS 1  
LASER PRODUCT**



System is Laser Class 1 when fitted with microscope enclosure and no additional probe.

System is Laser Class 3B without enclosure or when fitted with additional probe.

*For further information, visit [www.perkinelmer.com/raman](http://www.perkinelmer.com/raman)*

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