

Thermo Scientific DXR SmartRaman Spectrometer



Dependable
Raman analysis

Thermo
SCIENTIFIC

The Raman spectroscopy solution

Take advantage of the ease of sample preparation offered by Raman spectroscopy without having to invest in becoming an expert in the technology. Incorporating patented features making it easy to maintain peak performance, and deliver answers routinely and reliably, the Thermo Scientific™ DXR™ SmartRaman spectrometer was built to meet the needs of the multi-purpose analytical lab.

The DXR SmartRaman Spectrometer and Your Applications

One of the most versatile characteristics of Raman spectroscopy is its ease of sampling. With minimal preparation, samples are readily analyzed through glass and plastic packaging. Raman spectroscopy complements the FT-IR in your lab because samples that absorb IR weakly tend to be strong Raman scatterers and vice versa.

The DXR SmartRaman is a true walk-up-and-run Raman spectrometer designed as an analytical tool to take full advantage of the benefits of Raman spectroscopy.

Sample formats include:

- Liquids in clear and brown glass bottles • Samples in blister-packs
- Powders, liquids, slurries in multi-well plates • Tablets
- Samples in tubes, vials, cuvettes • Powders in plastic packages

Typical departments for the DXR SmartRaman:

- QC/QA • Analytical methods development
- R&D • Process development • Routine analysis

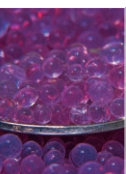
Typical industries:

- Forensics • Academic research • Dyes and chemicals
- Polymers • Food and packaging • Pharmaceuticals

The DXR SmartRaman Spectrometer

The DXR SmartRaman spectrometer is designed for bulk sample analysis in busy multi-purpose analytical labs where the users are looking for reproducible and accurate results from a dependable, low maintenance instrument. With patented autoalignment and automated calibration, the DXR SmartRaman is easy to maintain at peak performance without instrument downtime. Featuring autoexposure, autofocus, automated fluorescence correction, laser power regulation and Variable Dynamic Point Sampling, the DXR SmartRaman delivers optimal results, reproducibly time after time, without demanding that the user become a Raman expert.

- **Easily obtained results**
- **Excellent sensitivity**
- **Full spectral range**
- **Interchangeable Smart sampling accessories**
- **Full range of sample formats**
- **Low maintenance**
- **Expandable**



Maximum productivity

Maintaining peak performance effortlessly

A fully calibrated and aligned instrument delivers reproducible results dependably. With patented autoalignment, calibration and other features, routine instrument maintenance is easily incorporated into standard lab operating procedures.

Choice of Spectral Resolution

Choose standard spectral resolution for routine analysis. For hard-to-resolve bands, high-resolution gratings are available.



Easy-to-maintain Spectrograph

No moving parts, unique patented design optimizes performance at all wavelengths.

Pre-aligned Smart Components

Pre-aligned and lock-in-place laser, filters, and gratings use automatic recognition and store alignment allowing any user to reconfigure an instrument in seconds. Thermo Scientific™ OMNIC™ software checks for component compatibility.

Multiple Lasers

Be ready for any sample. Expand the capabilities of the DXR SmartRaman by adding additional excitation lasers. Minimize fluorescence interference or enhance sensitivity with shorter excitation wavelengths. Facilities with more than one DXR family instrument can share lasers, gratings, and filters for even greater versatility.

Smart Lasers

Automatically track laser lifetime.

User-replaceable Components

No service calls required to replace a laser.

Fine-adjust Assembly

Software-controlled to maintain peak performance.

Single USB Connection

Full instrument control from either a desktop or laptop computer through a single USB port.

Automated Calibration

Spectrograph, laser and Raman intensity calibrations are completely automated by OMNIC software using standards located in the alignment/calibration pod.

Patented Autoalignment

Keeps the excitation laser and the Raman scatter beam paths precisely aligned to the same sampling point for maximum sampling precision. No manual alignment necessary.

Laser Power Regulator

Compensates for changes in laser power output and guarantees consistent power at the sample.



Sampling versatility

Smart Accessories for all your needs

Quickly adapt to different sample formats with accessories that are designed for the full range of sample types. With the additional versatility from user installable excitation frequencies, you're assured optimal results, whatever the sample.

The DXR SmartRaman sampling accessories use pinned-in-place technology to attach to the DXR SmartRaman base, where they are automatically recognized by the OMNIC software using Smart technology. The identity and serial number of the accessory are recorded with the results for complete traceability.

The Universal Platform Sampling Accessory

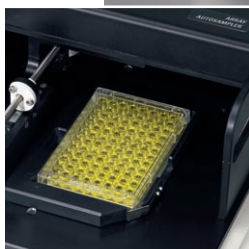
The Universal Platform Sampling accessory accepts up to four pinned-in-place, Smart toolheads, each designed to accommodate a particular sample format.



The Bottle Holder for analyzing the contents of standard bottles.



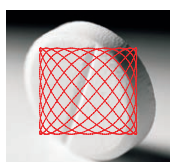
With its iris format, the Tablet Holder accepts tablets in a range of sizes.



The Array Autosampler automates analysis of multi-well plates and other samples in array formats.



The Universal Plate for samples such as plastic bags and glass vials.



The Universal Platform Sampling accessory employs Variable Dynamic Point Sampling (VDPS) technology to average the Raman signal from a heterogeneous sample without loss of Raman intensity. This unique technology overcomes the challenge of collecting representative spectra from heterogeneous samples, such as mixed powders or pharmaceutical tablets, without sacrificing Raman signal. The effective spot size is user-selectable and under software control.

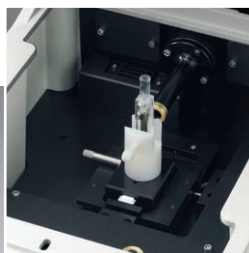
The Carousel Autosampler Accessory

The Carousel Autosampler accessory automates data collection from standard sample tubes. The removable carousels come in two sizes and accept standard 5 mm and 13 mm tubes. The accessory rotates the tubes during data collection to avoid sampling artifacts from heterogeneous samples.



Remote Sampling

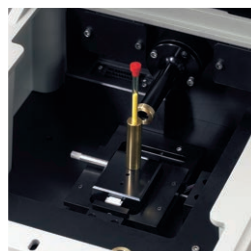
For remote sampling, the DXR SmartRaman accepts fiber optic probes.



The 180 Degree Sampling Accessory

For labs that handle samples in a variety of formats, the 180 Degree sampling accessory is the best option. Designed as a simple device to accommodate vials, tubes, powders and other samples, the 180 Degree accessory allows the use of specialty cells, including cryogenic, high-temperature, electrochemical and controlled-humidity chambers. The 180

Degree sampling accessory is particularly useful in environments that value diverse sample formats over highly automated data collection.



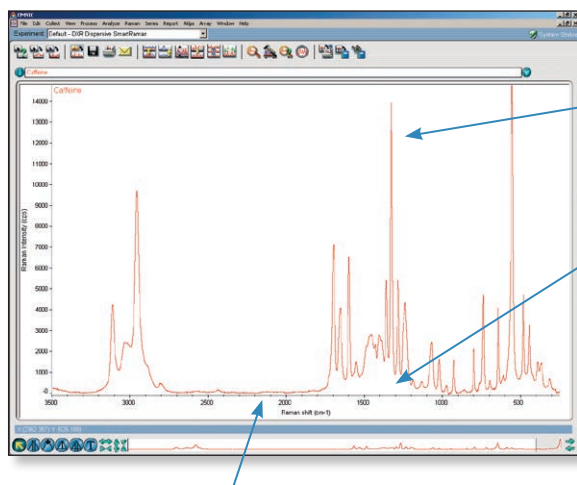
The power of Raman in an easy-to-use format

Raman is a powerful analytical tool, but it used to be difficult to use it to get reliable answers. It was hard to collect top quality data, hard to interpret the data and hard to keep a Raman instrument performing sufficiently well that the results could be trusted. We have fixed these problems with the revolutionary and patented innovations in the DXR SmartRaman.

Collecting Quality Data

Top Quality Results Made Easy

Unique software features such as Autoexposure, Smart Background and Autofocus supply the expertise required to collect optimal Raman data.



Smart Background

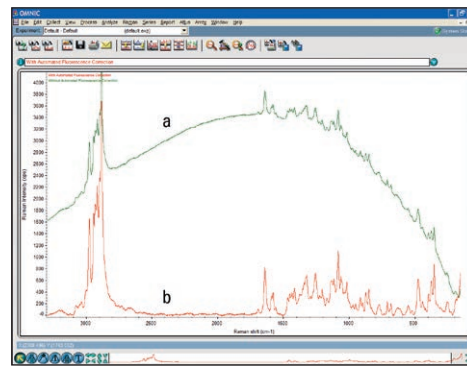
Collects background data during instrument downtime so you never have to wait.

Automatic Intensity Correction

Compensate for detector wavelength dependence.

Automatic Fluorescence Correction

Automatically corrects for fluorescence interference. Available for all excitation lasers. Spectrum of an anti-histamine: (a) without fluorescence correction; (b) with fluorescence correction.

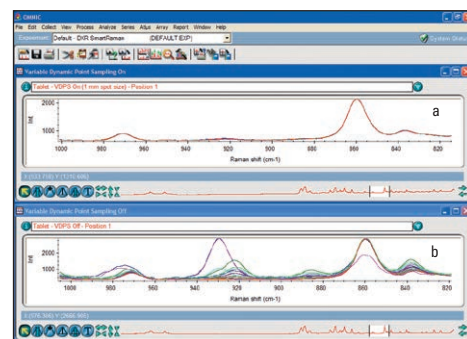


Autofocus

Optimizes the focus to maximize the Raman signal automatically.

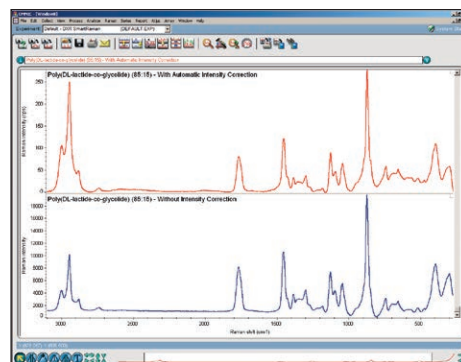
Autoexposure

Let the DXR SmartRaman calculate the exposure time and number of exposures for optimal sensitivity.



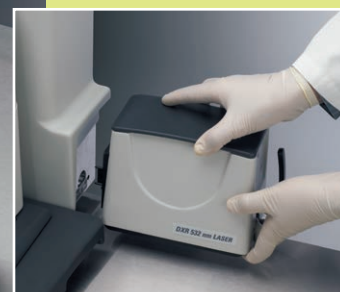
Variable Dynamic Point Sampling

Overcome the challenge of collecting representative spectra from heterogeneous samples. VDPS technology rasters the excitation laser beam over the surface of the sample without loss of signal. Spectra of painkiller tablet taken at multiple sampling points: (a) with VDPS on; (b) without the use of VDPS.



SmartLock Technology for Reproducible Results

Users can configure the DXR SmartRaman with up to four different excitation frequencies – at 455, 532, 633 and 780 nm. The lasers, together with the appropriate filters and gratings, lock into place on the SmartRaman using SmartLock technology for precisely reproducible results. OMNIC software recognizes each component, records the serial numbers and checks for compatibility. A convenient storage container is provided for when the components are not in use.

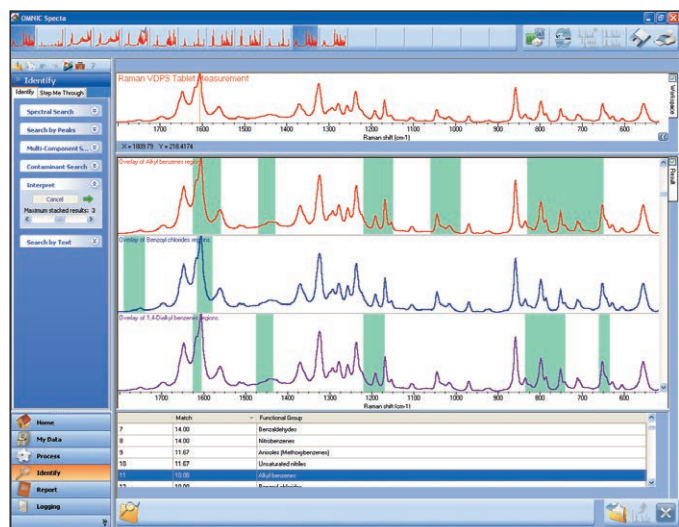


SmartLock Lasers

From Spectra to Answers

Spectral Analysis and Interpretation

Thermo Scientific™ OMNIC™ Spectra™ software provides efficient data management, simplified data processing, and powerful spectral identification.



In a single step, OMNIC Spectra reveals the identity of the three active ingredients in a tablet: acetaminophen, acetylsalicylic acid, and caffeine.

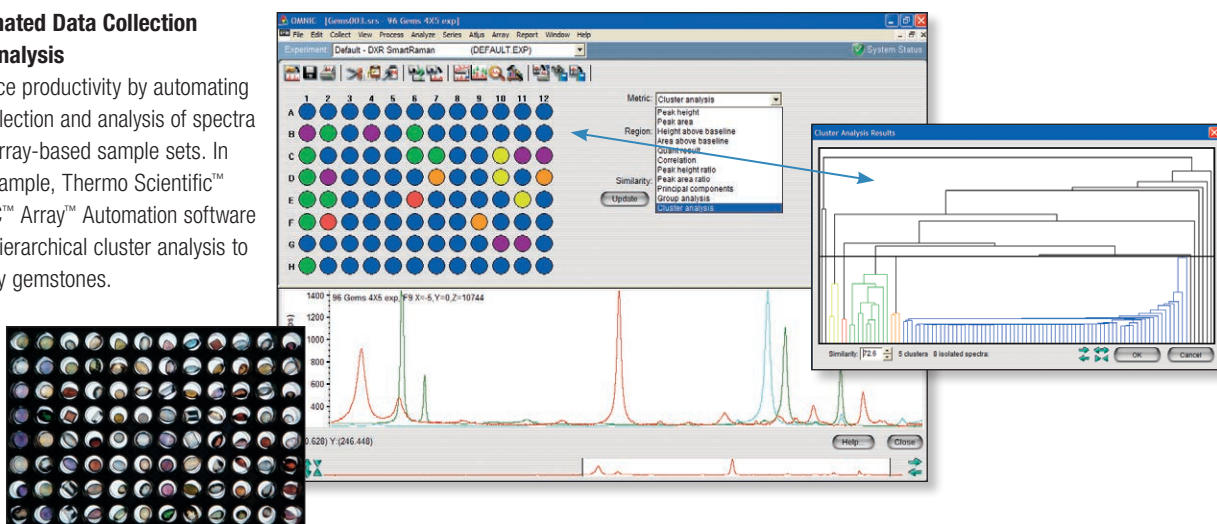


Multi-Component Search

Quickly and effortlessly characterize your spectra using spectral libraries on your system; reveal the identity of components in mixtures with this unique searching feature.

Automated Data Collection and Analysis

Enhance productivity by automating the collection and analysis of spectra from array-based sample sets. In this example, Thermo Scientific™ OMNIC™ Array™ Automation software uses hierarchical cluster analysis to classify gemstones.



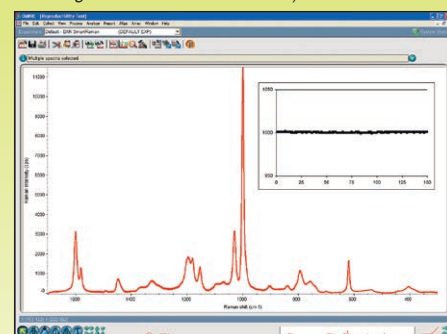
SmartLock Filters



SmartLock Grating



SmartLock technology ensures reproducible spectra even with multiple grating exchanges (plot shows an overlay of 150 spectra; grating exchanged between each collect).



DXR SmartRaman – Simply the Best

Raman Spectrometer

- Class 1 laser safe; safe to use in the open lab
- 455, 532, 633 and 780 nm lasers; factory aligned, user-interchangeable
- Full range gratings for complete spectra in one shot. 50 cm^{-1} to 3500 cm^{-1} *
- High-resolution gratings for difficult to resolve bands. 50 cm^{-1} to 1800 cm^{-1} (fingerprint region)
- SmartLock technology for reproducibly mounting lasers, gratings, and filters
- Smart components to report identity and serial numbers for compatibility checking, traceability and laser lifetime tracking
- Patented autoalignment procedure to ensure optimal alignment
- Rapid automated calibration to ensure validity of results
- Convenient storage for additional lasers, gratings, and filters

* Spectral range for the 780 nm excitation laser is 50 cm^{-1} to 3300 cm^{-1} .
Spectral range for the 455 nm excitation laser is 85 cm^{-1} to 3500 cm^{-1} .

Sampling

- Versatile pinned-in-place sampling accessories accept all sample formats
- Smart technology records sampling accessory and toolhead identity, plus serial number for comprehensive traceability
- Automation for high sample throughput – multi-well plates, tablets, tubes
- Variable Dynamic Point Sampling for representative spectra from heterogeneous samples
- Fiber optic port accepts fiber optic probes for remote sampling

Software

- Comprehensive OMNIC software suite for full instrument control and data processing
- OMNIC Specta software for highly efficient management and processing of spectral data for materials identification
- Extensive Raman libraries and easy-to-use search capabilities
- OMNIC Array Automation for automated data collection using the Array Autosampler toolhead and for post collection data processing
- Thermo Scientific™ TQ Analyst™ with chemometric models for comprehensive data analysis

Maintenance

- Single beam path spectrometer for robustness
- Spectrograph with no moving parts for dependable performance and reliability
- Minimal service requirements
- All consumables, including lasers, are user-installable
- Alignment and calibration software-controlled and performed routinely by the user

Validation

- Thermo Scientific™ ValPro™ System Qualification package for full validation to meet all regulatory requirements



The Thermo Scientific Family of Raman Instruments

Built on the same platform of reliability and ease-of-use, the DXR family of instruments take the guesswork out of Raman.

DXR Raman Microscope

The DXR Raman microscope is a workhorse research-grade microscope offering superior combination of performance and ease-of-use. With high spatial resolution, this point-and-shoot Raman can handle the most demanding analytical tasks.



DXRxi Raman Imaging Microscope

The high-performance DXRxi Raman imaging microscope produces stunning chemical images and offers rapid, research-quality results in a complete, integrated package. Offering real-time optimization of imaging parameters, automatic feature recognition and component identification, and its microscopy-first approach to spectroscopic analysis, this system accelerates research for new and experienced users alike.



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The DXR SmartRaman spectrometer, in the default configuration, is a Class 1 laser-safe products. Installation of a fiber optic port and fiber optic probe will convert all DXR family instruments to Class 3B laser-safe. DXR SmartRaman spectrometer may be manufactured under or covered by US Patents 7345760, 7471390, 7233870, 7605918, 7688530, and 8111392. The Universal Platform Sampling Accessory may be manufactured under or covered by US Patent 7595873.

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