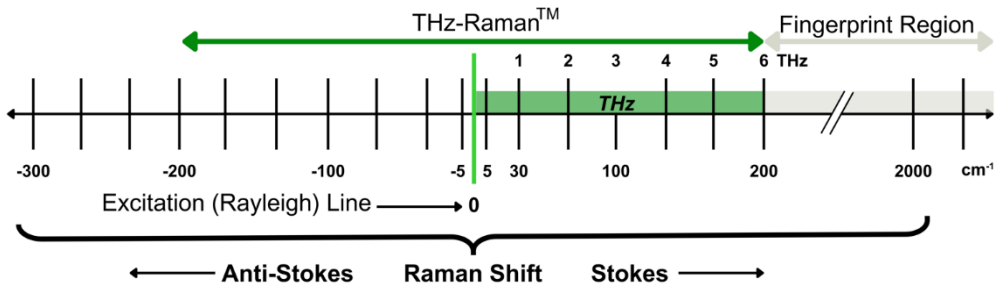
Integrated Spectroscopy Systems

THz-Raman™ Spectroscopy System

Advanced Materials Characterization



Our THz-Raman™ Spectroscopy Systems expand the capabilities of traditional Raman spectroscopy into the Terahertz/low-frequency domain, capturing the same range of energy transitions as terahertz spectroscopy while retaining the ability to measure the Raman "Chemical Fingerprint" region. With patented[1] ultra-narrowband notch and ASE clean-up filters, built-in thermal compensation, and a variety of sample accessories, these systems offer robust and stable performance for virtually any application. No special sample preparation is needed, enabling real-time, in situ analysis of material processes. This eliminates the need for multiple instruments or offline sampling, reducing capital equipment, training, and maintenance costs.



FEATURES

- Robust, sealed, patented optical design with broad range of operating temperature
- Multiple interchangeable sample accessories
- Simultaneous Stokes and anti-Stokes signals - improve SNR while providing an inherent calibration reference.
- Excitation wavelengths – 532, 785, 808 or 830 nm upto 300 mW
- **Dual-polarization variant** provides for simultaneous measurement Raman scatter in both polarizations.
- **Dual-laser variant (830 + 638 nm)** extends measurement range upto 3500 cm^{-1}, with high quantum efficiency
- Fiber coupled output enables optional interfacing with a wide range of spectrometers.

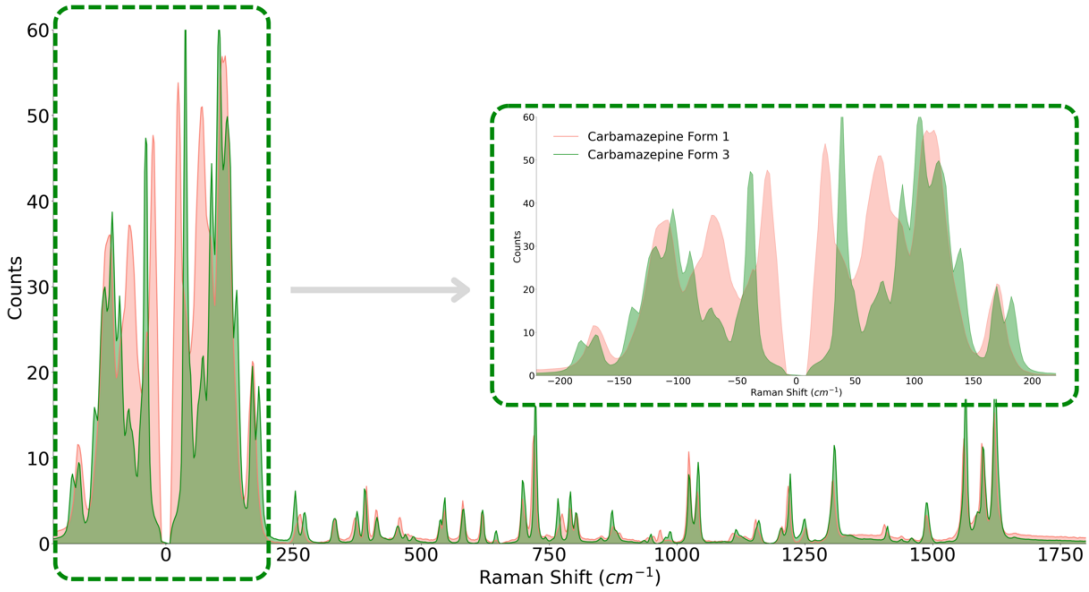
KEY APPLICATIONS

- **Process monitoring** of **phase transformations** and solid-state chemistry
- **In-line crystallinity monitoring** for amorphous solid dispersions (ASD)
- **Polymorphism** - differentiation and **salt screening** of polymorphs
- Crystallinity meter - Monitoring and quantifying **degree of crystallinity**
- Characterizing and observing co-crystal formation
- **Nanomaterials** - characterizing thickness and orientation of **Two-dimensional nanomaterials l**ike **TMDs.**
- Structural characterization of polymers

[1] US Patents 7,986,407 and 8,184,285

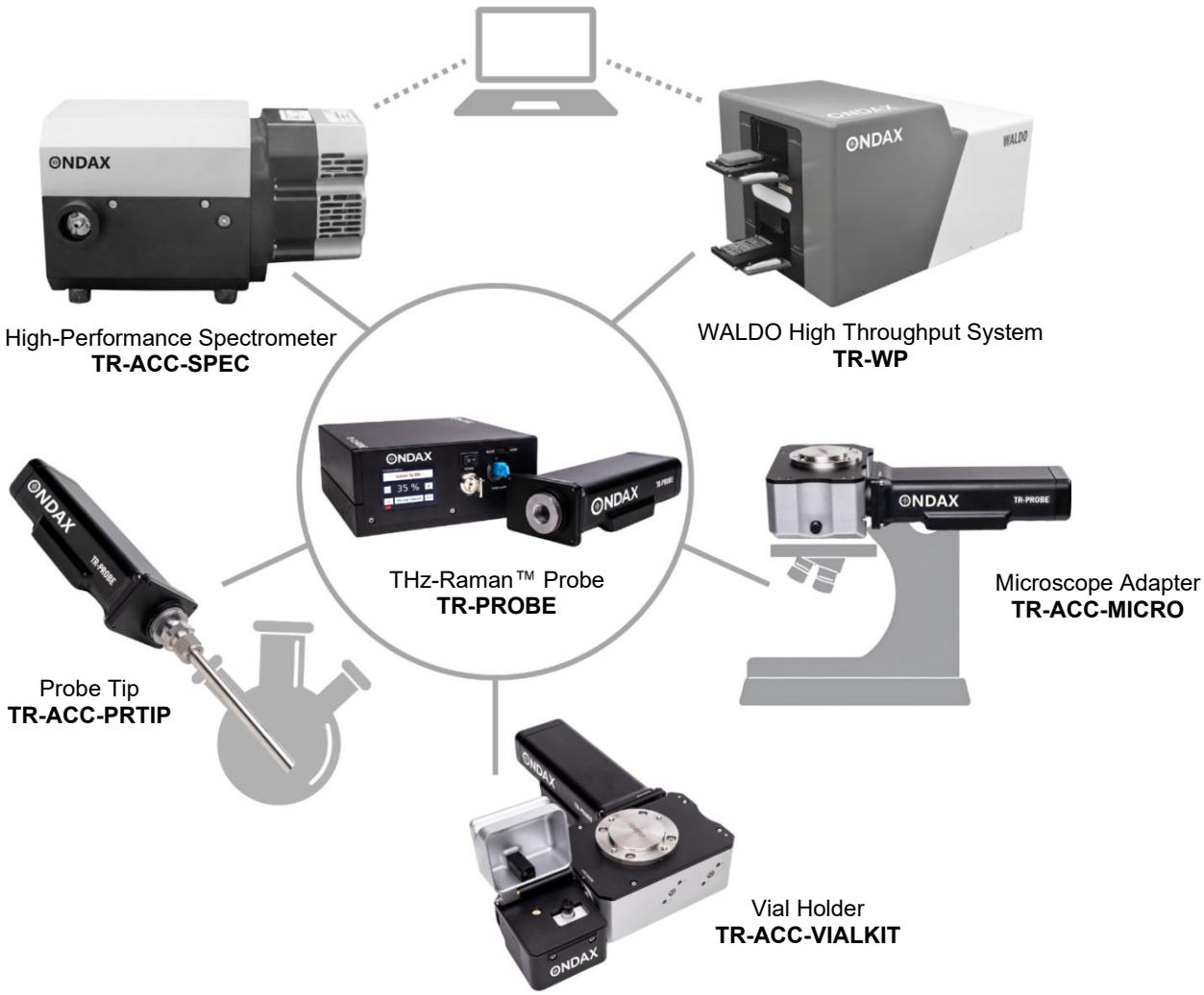
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EXAMPLE APPLICATION: POLYMORPHISM IN PHARMACEUTICAL R&D



Carbamazepine data shown above measured using TR-PROBE at 785 nm.

SAMPLING OPTIONS



High-Performance Spectrometer
TR-ACC-SPEC

WALDO High Throughput System
TR-WP

THz-Raman™ Probe
TR-PROBE

Probe Tip
TR-ACC-PRTIP

Microscope Adapter
TR-ACC-MICRO

Vial Holder
TR-ACC-VIALKIT

ONDAX

SAMPLE INTERFACE ACCESSORY DETAILS

Vial Adapter



The vial adapter simplifies sample insertion and includes various vial inserts, a tablet clamp, micrometer for fine focus, and an automatic safety shutter.

Bottom-Up Vial Adapter



The bottom-up vial adapter is useful for vials with opaque, labelled sidewalls or low sample volume. It includes a micrometer for fine focus and an automatic safety shutter.

Free space Adapter



This free space adapter is a steerable non-contact adapter, which rotates 360° for stand-off applications, supports various lenses, features fine focus adjustments, and includes a manual safety shutter.

Microscope Adapter



The microscope adapter connects with most popular brands of microscopes, providing visual images while measuring Raman spectra. The added side port (shown above) provides optional interfacing with our vial adapters.

FloodLight Large Area Illumination Adapter



The FloodLight adapter averages samples over a larger area for best THz-Raman™ signal capture, switchable to static for spatial variations.

Transmission Raman Adapter



The forward scattered Raman signal is measured from the bulk, rather than just from the surface. This provides a volumetric/bulk average making this adapter useful for coated and multicomponent pharmaceutical tablets.

Contact / Immersion Probe Tip



The probe tip uses a UV sapphire ball lens for easy sample analysis, available in various lengths and diameters, and connects via SwageLok mount.

Non-contact Probe Tip



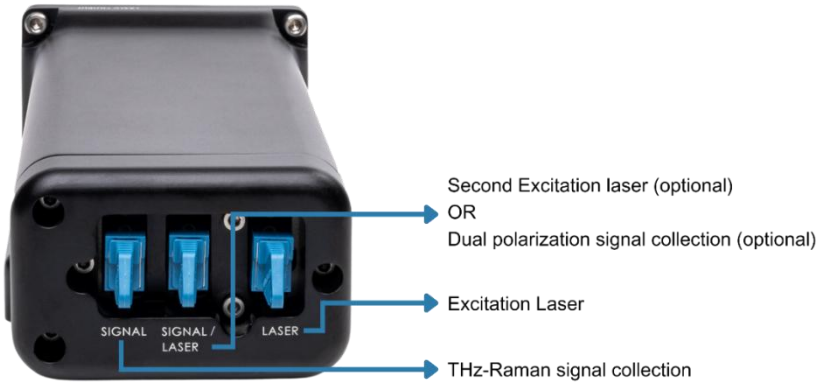
Integrate with SCHOTT's ViewPort® bioreactor interface, which provides a sterile and safe interface for in-situ process monitoring with optical sensors.

Specifications	TR-PROBE			
Wavelength (nm)	Single Wavelength Excitation			Dual Wavelength Excitation
	532	785	830	830 + 638
Power at Sample Port (mW)	75 (single mode)	50 (single mode) 300 (multi-mode)	300 (multi-mode)	100 (638 nm, multi-mode) 300 (830 nm, multi-mode)

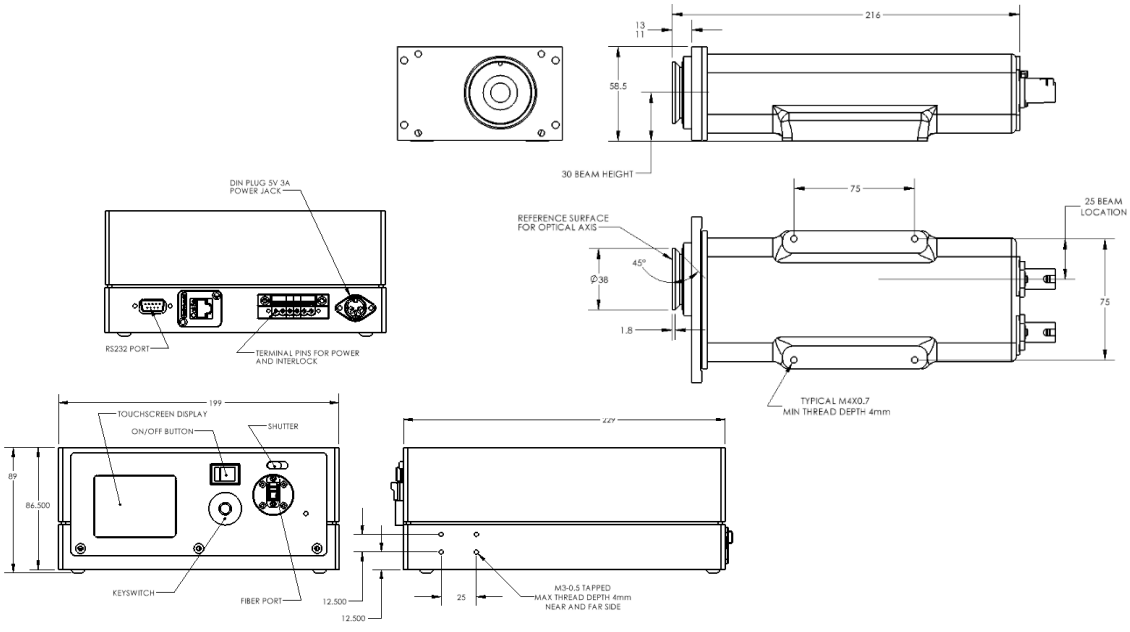
Specifications	Spectrograph	
Spectral Range (nm) 740 to 1040 nm	785	830
	-770 to +3120 cm^{-1}	-1460 to +2430 cm^{-1}
Stray Light (Monochromatic Input)	<0.03% (at ± 40 nm from peak)	

Specifications	TR-PROBE	CleanLine	Spectrograph
Weight (kg)	1.6	3.5	6.9
Physical Dimensions[2] (mm) (L x W x H)	215.9 x 76.2 x 58.4	229 x 199 x 89	266 x 155 x 162

[1] Specify power level at time of order.
[2] Probe head only, does not include sample accessory.



Outline Drawing (all dimensions in mm)



ATTENTION: OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

RoHS compliant

WARNING
LASER
3B
AVOID EXPOSURE TO BEAM
THIS PRODUCT IS INTENDED FOR USE SOLELY AS A COMPONENT OF AN OEM PRODUCT AND DOES NOT COMPLY WITH CDRH PERFORMANCE STANDARDS 21 CFR SUBCHAPTER J IF OPERATED AS A STANDALONE INSTRUMENT

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