Explosives, Drug and Hazmat Detection and Source Attribution

Challenge:

Today's forward-deployed warfighter and security professionals need to ***rapidly and reliably*** identify various compounds or residues found in the field to distinguish between inert materials and home-made explosive (HME) compounds. Forensic experts also need timely data to help identify those responsible, in order to contain the proliferation of HME attacks.

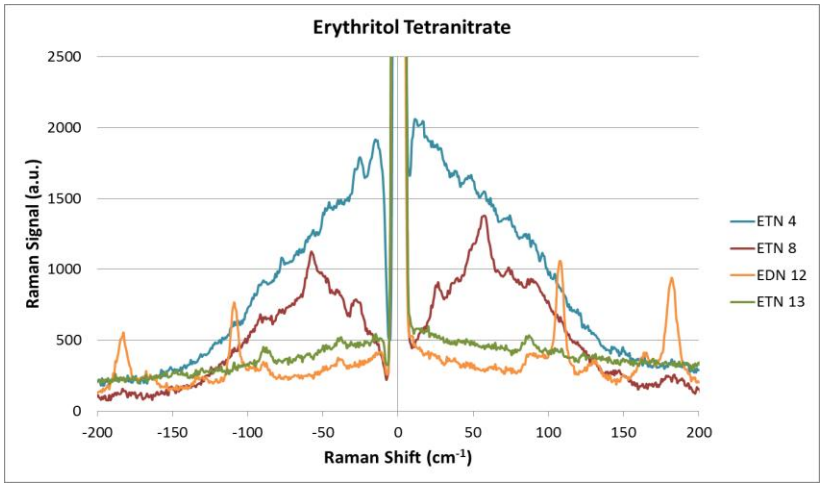
Traditional Solutions:

Raman spectroscopy has emerged as a proven technique for chemical identification, however current techniques occasionally produce erroneous readings, and do nothing to help determine ***"Who made it***?" Forensic experts need data relating to ***ingredient sources, contaminants*** and ***methods of manufacture (***or ***synthetic pathways),*** as well a insights into the formulation and storage environment which can reveal clues about where it was made. Getting this additional information can often require large, expensive, equipment, and special sample handling and preparation.

Ondax Solution:

Low-frequency/ THz-Raman analysis can identify and differentiate synthetic pathways, ingredients, and formulations, as well as reveal changes relating to environment and storage (e.g. heat, humidity). Each of these factors can leave behind telltale "signatures" or "fingerprints" in the molecular structure that help the forensic specialist in narrowing or accelerating their search for the perpetrator. Ondax THz-Raman® systems extend the range of traditional Raman spectroscopy to the terahertz/low frequency regime, where differentiation of inter- and intra-molecular structures can be clearly seen. Anti-Stokes signals add to Raman intensity and improve SNR.

Ondax THz-Raman® systems enable fast , reliable capture of both chemical fingerprints for detection and "synthetic signatures" to assist with source attribution. improved sensitivity and reliability.



Features / Benefits

- ***Fast, simultaneous capture of BOTH chemical AND structural information***
- ***Works with small traces of materials***
- ***Enhanced sensitivity and reliability due to additional low-frequency and anti-Stokes signals***
- ***Non-contact, non-destructive and requires no sample preparation***
- ***Works at standoff distance***
- ***Simple, compact, cost-effective***
- ***Can be miniaturized for portable or field use***

Multiple samples of ETN (Erythritol Tetranitrate), representing systematic variations in primary ingredients as well as types of acids, salts, and preparation routes, show distinctive differences (left).

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More info at www.THz-Raman.com

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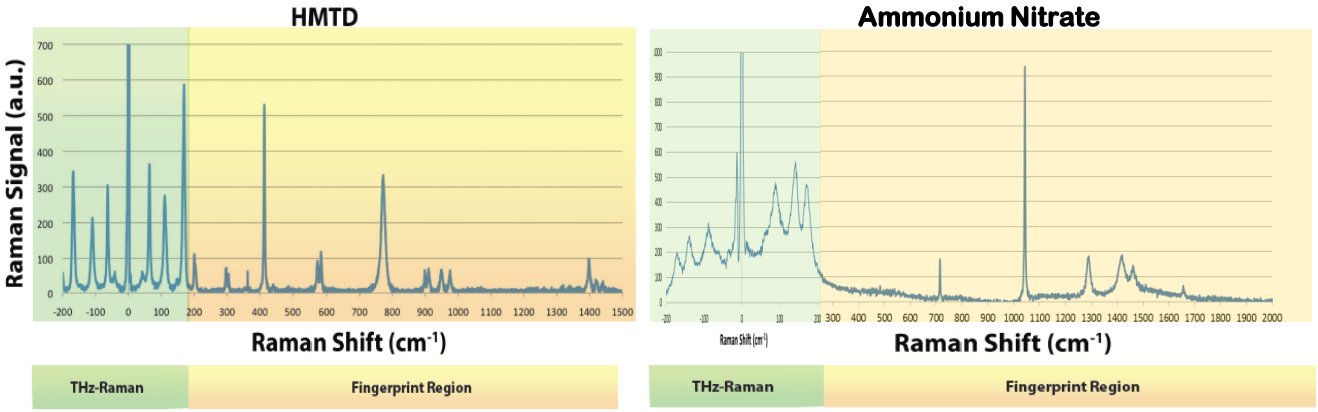
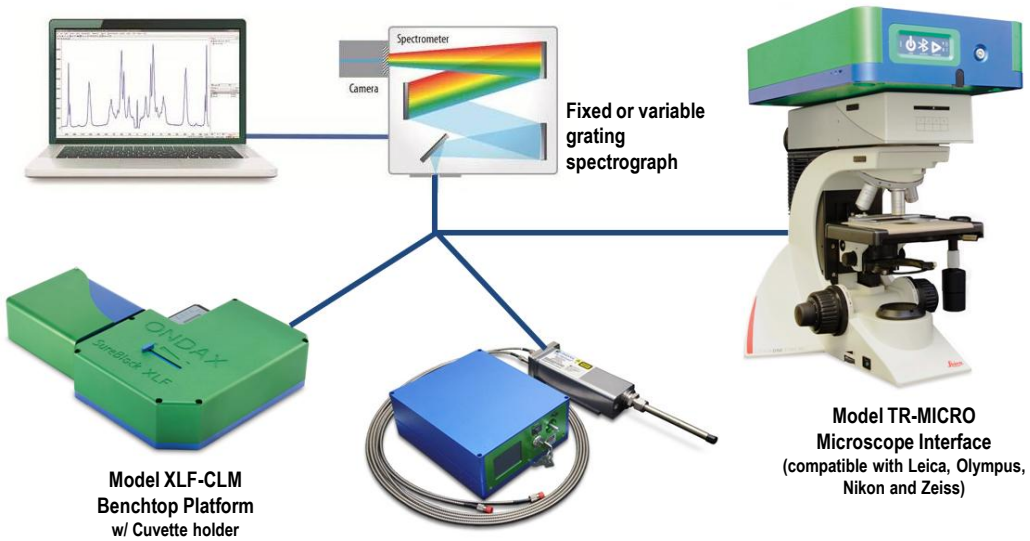
THz-Raman PLUS fingerprint region measurement with the same system

THz-Raman analysis of HMTD (Hexamethylene Triperoxide Diamine) and Ammonium Nitrate is shown below. The strong, distinctive peaks in the low-frequency/THz-Raman region (green background) are typically higher than the traditional fingerprint range, adding signal, improving sensitivity and reducing false positives. Peak symmetry about the excitation line also enables auto-calibration and enhanced system and data reliability.



Ondax's patented[2] **THz-Raman® Spectroscopy Systems** extend the range of traditional Raman spectroscopy into the terahertz/low-frequency regime, exploring the same range of energy transitions as terahertz spectroscopy – without limiting the ability to measure the fingerprint region. This enables ***simultaneous analysis*** of both molecular structure and chemical composition for advanced materials characterization.

All **THz-Raman®** systems are compact, robust, plug-and-play platforms that deliver incredible speed, throughput and ease of use, all at an extremely affordable price. With a broad selection of excitation wavelengths from 488nm to 1064nm, optional polarization control and a wide variety of sample interfaces, there is a THz-Raman® solution for any application.



[2] US Patents 8,184,285 and 9,986,407

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