

B&W Tek Raman Solution Suite for Forensics Applications

Introduction

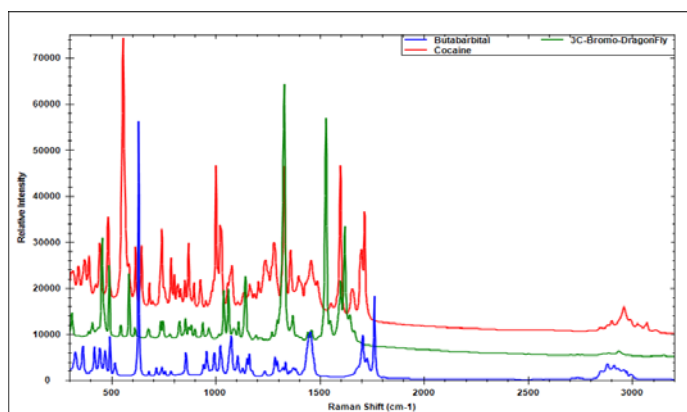
Law enforcement personnel, laboratory technicians, crime scene investigators and many others face a significant challenge for identification of materials in a forensic investigation. During an investigation, technicians must routinely examine materials such as gun powder residue, drugs of abuse, hair sampling, chemical precursors and more. Traditionally, technicians used multiple forms of identification in order to collect results from various



forms of forensic samples. Although certain technologies are ideal for precise laboratory identification, many technologies, such as Raman spectroscopy, can be successfully used for cursory identification of multiple forensic sample types either directly in the field or in the lab.

Raman Spectroscopy Overview

Raman spectroscopy is a well-established, highly sensitive analytical technique that can be used to analyze solids, liquids, and slurries. Raman is a type of vibrational spectroscopy, a technique that is sensitive to the vibrations of atoms in molecules which can be used for identification of a compound.



Infrared (IR) spectroscopy is another vibrational spectroscopy technique. Both Raman and IR have been used in forensic laboratories for decades due to their high specificity and low false alarm rates. Raman spectroscopy is specific to the chemical structure of a material and can consequently be used to nondestructively identify a sample, providing a significant advantage compared to other methods. Organically-based chemical compounds,

such as drugs of abuse, have molecules that vibrate at discrete frequencies. The number and frequency of these vibrations depend primarily on the number of atoms in the chemical compound

and how these atoms are connected via specific chemical bonds. Since the types of atoms, the number of each type of atom, and the connectivity between the atoms differ between chemical compounds (such as cocaine versus methamphetamine), the vibrational frequencies, or Raman spectra, will be different. Raman spectroscopy utilizes this difference in each compound's vibrational frequencies to differentiate compounds.

TacticID 785nm Handheld Raman System

Ideal for bulk sampling of narcotics, pharmaceutical drugs, explosives, hazardous materials, cutting agent, precursors and more

The TacticID is a handheld, field-based narcotics identification system that rapidly identifies numerous narcotics, explosives, and more in mere seconds, per test.



Leveraging Raman spectroscopy, the TacticID provides the high chemical specificity of Raman along with non-destructive and non-contact analysis. This minimizes exposure of law enforcement officers to unknown materials while maintaining the original state of the evidence. Most narcotic samples can be quickly identified in their original packaging by simply pressing the sample within a container, such as a plastic bag, against the sampling tip of the analyzer and pressing the scan button.

The TacticID provides a clear, definitive result, with no user interpretation required. All scans are time and date stamped and stored automatically in the analyzer. The intuitive user interface allows law enforcement officers to easily transfer the data from the handheld unit to a computer for automated storage and reporting. The analyzer includes a diagnostic self-check system to verify that the instrument is working properly at the time of use and can support chain of custody for prosecution with permanent, printable records.

i-Raman EX 1064nm Fiber Optic Portable Raman System

Ideal for forensic analysis, bioscience/biomedical diagnostics, pharmaceutical material analysis, explosive detection, petroleum analysis, food/agriculture and more

The i-Raman EX portable Raman system is ideal for forensic analysis, including narcotics, pharmaceutical material analysis, biological samples and more. The i-Raman EX is an extension of our award winning i-Raman portable Raman spectrometer featuring a 1064nm version of our patented



CleanLaze® excitation laser. Using a high sensitivity InGaAs array detector with deep TE cooling and high dynamic range, this portable Raman spectrometer delivers a high signal to noise ratio without inducing auto-fluorescence, making it possible to measure a wide range of biological samples. The i-Raman EX provides spectral resolution as fine as 9.5cm^{-1} and a spectral coverage range from $250\text{-}2500\text{cm}^{-1}$, enabling you to measure the entire fingerprint region. The system's small footprint, lightweight design, and low power consumption provide research grade Raman capabilities anywhere. The i-Raman EX comes standard with a fiber optic probe, and can be used with an XYZ positioning stage probe holder, a cuvette holder, video microscope and our proprietary BWIQ multivariate analysis software. With the i-Raman EX, a high precision qualitative and quantitative forensic solution is at your fingertips.

BAC151B Raman Video Microsampling System for i-Raman EX

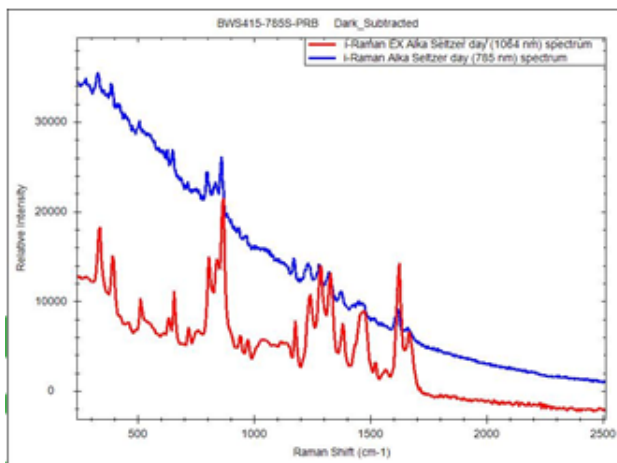
The BAC151B is a Raman microscope that is compatible with the i-Raman EX system for forensic applications. It was designed to offer the highest level of flexibility in facilitating Raman sampling for a variety of applications. The BAC151B can be configured to fulfill the exact requirements of your application. The integrated camera allows for precision Raman sampling through camera monitoring of the laser beam and imaging details. When coupled with the i-Raman EX, it provides the advantages of a Raman microscope at a fraction of the cost of most research instruments. The video head can easily be mounted to a tripod, which is available as an accessory.



i-Raman EX for Heroin Identification

Heroin is a major drug of concern in nearly every part of the world and is gaining in popularity among various social classes, which previously preferred drugs such as cocaine and ecstasy. Many handheld

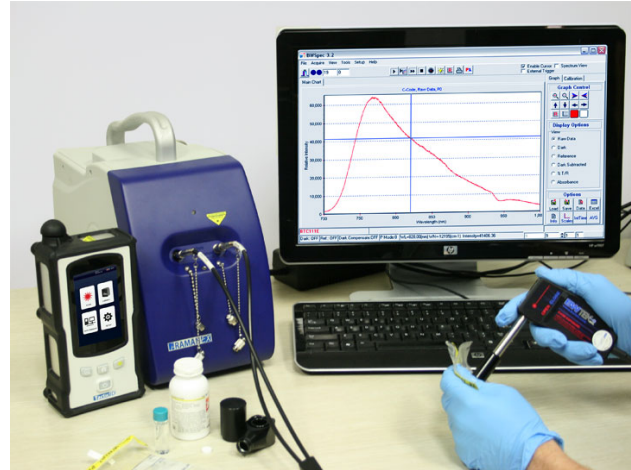
1064nm iRaman EX spectrum compared to a 785nm nm excitation spectrum.



instruments available today that utilize a 785nm wavelength, including the TacticID, are unable to identify common street heroin due to its natural high fluorescence and impurity from excessive material cutting. Due to the longer 1064nm wavelength, the i-Raman EX is not limited by the fluorescence issue generally associated with heroin identification using Raman spectroscopy. The i-Raman EX is ideal for highly accurate, specific identification of all forms of heroin, ranging from pure samples to highly diluted black tar street samples.

Conclusion

Together, the B&W Tek TacticID and i-Raman EX with microscope accessory provide a powerful identification kit that can identify a wide variety of samples commonly found during forensic investigations. In the past, Raman spectrometers of this type of caliber were confined to large form factors within laboratories. Today, both cutting edge systems are designed to provide equally clear results in the field or in the lab in a lightweight, easy to use form factor.



Utilizing this forensic suite, users can bring laboratory proven forensic identification equipment anywhere they need to be, resulting in increased productivity without compromising the quality of the techniques or the equipment.