B&W Tek TacticID for Narcotics Identification

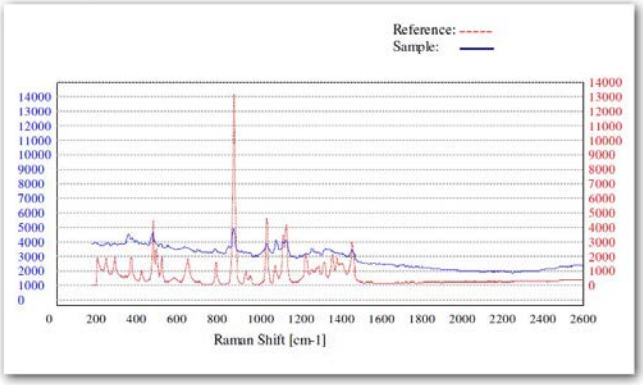
Introduction

Law enforcement officers responsible for reducing narcotics trafficking and drug abuse face more challenges than ever before. New drugs are appearing at an alarming rate and the global drug problem is spiraling out of control.

Today, the legal process from arrest to prosecution can be lengthy and quite costly to taxpayers. After an arrest, narcotic-specific test kits are typically used by law enforcement to obtain a positive indication for presumptive evidence. However, for new and emerging drugs, specific test kits may not be available yet. While narcotic-specific kits can be used in the field or at a police station, seized samples are subsequently sent to a state laboratory for confirmatory testing. Overburdened laboratories may require weeks or even months before test results reach the prosecutor's hands. The burden and stress placed on chemists to process samples as quickly as possible can be substantial.

Confirmatory analytical techniques that are relied on for analysis are now being miniaturized and simplified and are making their way into field instrumentation. The transition from lab-based to field-based analyzers allows users to conduct the same reliable measurements at the point of arrest, reducing the burden on crime labs and accelerating the prosecution process. One of the most common analytical techniques transitioning from the laboratory to the field is Raman spectroscopy.

Raman Spectroscopy Overview



Raman spectroscopy is a well-established, highly sensitive analytical technique that can be used to analyze solids, liquids, gases and more. 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 spectroscopy (IR) 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 specific 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. Because 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.

Raman spectroscopy was discovered by C.V. Raman in the 1920s and he later received the Nobel Prize in Physics for his discovery. Today, Raman spectroscopy is a generally accepted analytical technique and is recommended for use by the US Food and Drug Administration (FDA) and the United States Pharmacopeia (USP) for the chemical identification of ethical pharmaceuticals. The use of Raman spectroscopy for narcotics identification is well within the capability of the technique, meaning that it is well-suited for use by law enforcement and other first responders.

Field-Based Narcotics Identification

Handheld, field-based Raman spectrometers have been used extensively for field-based identification of explosives and hazardous chemicals. Small, ruggedized equipment allows first responders to conduct a quick and safe initial screening assessment of potentially hazardous situations.

More recently, Raman handheld systems have been used for field-based narcotics identification. As noted, Raman spectroscopy is a well-established forensic laboratory technique. Further, it is also accepted by the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) for the analysis of controlled substances. Forensic labs tasked with providing confirmatory narcotic testing results also frequently use gas chromatography/mass spectrometry (GC/MS), which some consider the gold standard in analytical instrumentation. Although GC/MS provides definitive results, it is a costly, destructive, laboratory-based technique that is time-consuming and contributes to the backlog of samples, subsequently delaying the reporting of results back to law enforcement agencies waiting to prosecute cases.

Raman Spectroscopy, a Proven Technique

Raman spectroscopy already has a proven track record in U.S. Federal District Courts. A number of civil actions, specifically intellectual property cases involving patent litigation in the pharmaceutical arena have relied on results from Raman spectroscopy.

Raman spectroscopy for the chemical identification of narcotic (or controlled) substances meets the Daubert admissibility standards, namely:

1) Raman spectroscopy is a well-understood technique in which multiple uses in numerous fields (chemical, polymer, biological, pharmaceutical, materials science) have been published in thousands of peer-reviewed journals, books, treatises, and book chapters;

2) The theory of Raman is well understood and the discoverer, Sir C.V. Raman, was awarded a Nobel Prize for his discovery and explanation of the theory;

3) The scientific community has established standards that can assess the accuracy and precision of the technique that are available to the scientific community from nationally recognized standard-setting organizations;

4) Raman has been tested in the laboratory and in field settings on a broad scale as well as in the specific context of narcotics testing;

5) The relevance and reliability of the technique has been tested and reported by the scientific community; and

6) Raman spectroscopy is a generally accepted technique by the scientific community and is authorized for use by the US FDA and USP and in the European Union (EP 2.2.48).

B&W Tek TacticID for Narcotics Identification

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 that is contained in 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.

Additional features include a high resolution touch screen for quick on-scene note taking, customizable libraries, Wi-Fi connectivity and data transfer, remote operation via tablet computer and multiple sampling accessories to maximize user versatility.

The Melendez-Diaz Case

In the United States court system, attorneys representing defendants in narcotics cases are allowed to subpoena any scientists that present laboratory test results on suspected narcotics samples submitted into evidence— a consequence of the 2009 United States Supreme Court ruling on Luis E. Melendez-Diaz v. Massachusetts. This influential decision resulted from a 2001 cocaine trafficking case involving Luis Melendez-Diaz. The local court ruled that Melendez-Diaz' 6th Amendment rights were violated—his right to confront his accuser—when the lab technician who performed the testing on the "white powder" identified as cocaine did not testify in person. During the original trial, the defense attorney objected to the laboratory certified evidence based on the 6th Amendment, but the court over-ruled the objection.

Melendez-Diaz was found guilty, appealed, lost, and was eventually convicted. Later, Melendez-Diaz appealed his case to the U.S. Supreme Court, which reversed the Massachusetts appellate court ruling in 2009, and a new precedent was set. Defense attorneys are now allowed to request testimony from the scientist who completes narcotics testing used as evidence for prosecution. This ruling has a

tremendous impact on the competing tasks of the scientists: timely analysis of sample submissions versus court room testimony.

Due to these new burdens on lab technicians and the prosecution, shifting a portion of narcotics identification work from the laboratory to the field could reduce sample backlogs and yield a faster and more streamlined prosecution process for all narcotics cases.

Conclusion

While there is variation from state to state and country to country, the current process of adjudicating drug-related arrests is similar. After presumptive testing, samples of seized drugs are typically sent to a laboratory for analysis. Despite an increase in drug trafficking, cost-cutting pressures are forcing jurisdictions to evaluate how many drug cases they prosecute and whether or not these drugs are sent to the lab for analysis.

In the 1970s, there was a significant movement to reduce the number of lab tests for DUI arrests. This resulted in the acceptance of field-confirmatory breathalyzer/ blood alcohol content testing for DUI arrests. Narcotics testing is following a similar path. Additionally, the added time-burden of defense attorneys having the ability to require chemists to testify in court as a result of the Melendez-Diaz ruling has had a significant and costly impact on the judicial process of prosecuting a drug user or drug dealer. Finding a way to relieve this pressure could significantly reduce the high costs associated with laboratory drug testing.

In addition to reducing laboratory backlogs, there are other significant opportunities where using the TacticID could ease the costly burden of narcotics analysis on law enforcement agencies. First, it can be used as a screening tool for multiple sample submissions to a laboratory. In this scenario, laboratories could sample a smaller set of submissions for confirmatory testing. Second, it could be leveraged for field confirmatory identification for possession cases, thereby allowing laboratories to focus on trafficking cases and samples that fall outside the capabilities of field instrumentation.

The TacticID is an easy-to-use system which provides clear, definitive results and automatic, comprehensive reports for every analysis. In addition to numerous reporting features, the analyzer collects detailed spectral data, which can be further analyzed and compared to library standards if needed for prosecution.

With the TacticID analyzer, law enforcement officers can identify suspected narcotics and controlled substances at the point of seizure or at a station with a reliable, court- and lab-proven technology.

