

COMBATING THE FENTANYL EPIDEMIC USING HANDHELD 1064NM RAMAN

Avoiding Exposure to Fatal Opioids

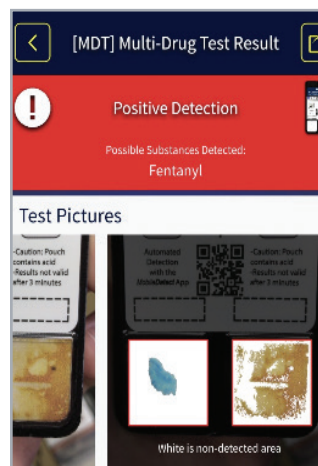
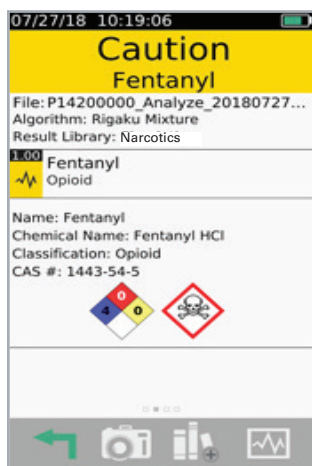
As synthetic opioid overdose deaths continues to rise, the use of fentanyl and its analogues in legacy drugs are posing significant danger to communities, as well as first responders. Fentanyl has become popular in illicit drug sales by itself, or as a cutting agent in heroin, cocaine, and methamphetamine. The lethal dose of pure fentanyl is estimated at 2 milligrams for a typical adult (Reference: U.S. DEA). Responders encounter fentanyl in various forms, such as powder, tablet or liquid and risk potential fatal exposure if swallowed or inhaled. They are faced with this problem at our borders, in mailrooms, and on the streets.



Due to the high risk of fatal exposure, there is no time for outdated testing techniques of these controlled substances. The use of field-ready analytical techniques that can provide presumptive test results is critical in response to potential fentanyl use. In recent years, handheld Raman spectrometers that provide chemical identification are being used more frequently by law enforcement, border protection (at the border, as well as in international mail facilities), and first responders as a way to identify suspicious threats. Recognized as a Class A analytical technique for presumptive field testing by the U.S. Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG), Raman spectroscopy provides a chemical fingerprint that is legally defensible in court. Even more importantly, handheld Raman analyzers provide a means for the officer to scan through packaging, reducing the risk of exposure to these dangerous synthetics.

Designed for the non-scientist with results that are easy to interpret, the Rigaku portfolio of 1064nm-based handheld Raman analyzers provide fentanyl analysis for the most difficult sample types. By providing the ability to analyze bulk or trace amounts, through colored packaging, or even in mixtures, the user will always receive fast results.

Typically larger, bulk amounts of these drugs are crossing borders and smaller, even trace amounts are making its way onto our streets. It can be difficult for one analytical tool to cover such wide application needs, until now. The Rigaku ResQ® CQL 1064nm analyzer is the first field-ready handheld Raman tool to provide both bulk and trace analysis of narcotics and explosives in seconds. Users benefit from reduced fluorescence interference of the 1064nm Raman advantage when scanning through packaging or colored substances, while also having the ability to detect residues or non-visible amounts easily using the QuickDetect automated colorimetrics functionality - thus providing the ability to analyze more. Law enforcement officials are able to stay ahead of the threats posed by the rapid proliferation of fentanyl variants by easily adding new chemicals to the library as rapidly as they occur.



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ADVANCED 1064NM RAMAN USED TO COUNTER THREATS IN TRANSPORTATION SCREENING

New Explosive Threats and Deadly Narcotics

In June 2018, in response to a foiled terrorist plot in Australia and long-standing concerns about improvised explosive devices (IED) containing powder explosives, the U.S. Transportation Safety Administration (TSA) announced and implemented new screening requirements. Passengers with carry-on baggage containing powdered materials in quantities above 12 oz (350 milliliters), the capacity of a soda can, could be subject to additional screening. U.S.-bound flights from 280 international airports are now required to implement these new screening requirements.



Combustible powders can present in many forms, from fertilizer to mining grade explosives. In addition to those that could pose a threat when used in IEDs, security operators in airports, law enforcement and customs operations are also concerned with illicit narcotics in powdered form. The transport of deadly narcotic opioids, such as fentanyl, pose dangers to screeners and passengers alike. Fentanyl derivatives, like carfentanyl, are lethal in quantities as small as a single gram. These opioids present danger to law enforcement when interdicted or discovered. New Raman analyzers can play a role in preventing unnecessary or unintentional exposure of first responders, law enforcement, and the public, to this danger.

Improved Threat Detection for Checkpoint and Airport Screening

Security operators require enhanced detection capabilities to detect emerging and evolving threats. Cosmetics, spices, coffee and protein mixes are common powders and could be subjected to screening. New or additional checkpoint screening requirements slow screening operations and often result in longer lines and delays as passengers need to remove their carry-on powdered items or others. Security officers are challenged to screen and possibly re-screen substances to identify and determine that they are safe to carry aboard aircraft.

Advancements in mobile and handheld chemical threat identification technology can increase operational efficiency by streamlining passenger and baggage screening processes. Rigaku's 1064nm handheld Raman is an example of an advanced next generation technology providing rapid and actionable results required for airport and transportation hub security operations.

High Performance Raman Spectroscopic Analyzers

Used in the field by militaries and law enforcement departments around the world for over 20 years, first generation portable Raman spectroscopic systems used shorter wavelength (785 nm) lasers to measure the energy scattered by a target material and compare its specific signature to a built-in library to identify substances. Raman technology is nondestructive which allows the target material to be preserved for evidentiary purposes. Raman analyzers can determine if a material is a harmless powder, illicit substance, or a powdered explosive. However, these 785nm Raman systems have significant limitations and are unable to identify the broadening range of chemical substances currently in the threat stream or of interest to law enforcement.

1064 nm Raman Systems

New advanced Raman systems are now available that utilize a longer wavelength of laser (1064 nm), to support the reliable identification of an expanded library of threats and chemicals of concern to TSA, security operators and law enforcement in the U.S. and around the globe. These high-performance analyzers address the critical challenge fluorescence poses to older Raman systems.

1064 nm Raman Systems

Fluorescence occurs when the system's laser beam is absorbed by the powder or substance being analyzed, preventing the system from being able to discern characteristic spectral peaks sufficiently to render its identification to the user. Many current threats, contraband, as well as common cutting and filler substances, exhibit fluorescence. Colored materials and packaging also fluoresce, confounding identification of a wide range of chemicals, narcotics and materials of concern. 1064 nm Raman systems are proven to limit sample-induced fluorescence interference, thus broadening the range of identifiable materials to include colored substances, organically derived materials and colored/degraded substances within colored packaging without having to open the package to disturb the sample. Substandard or counterfeit drugs can easily be identified as well.

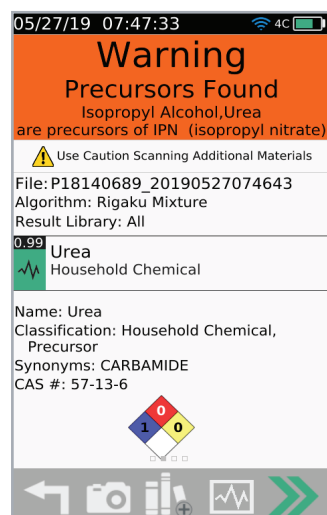
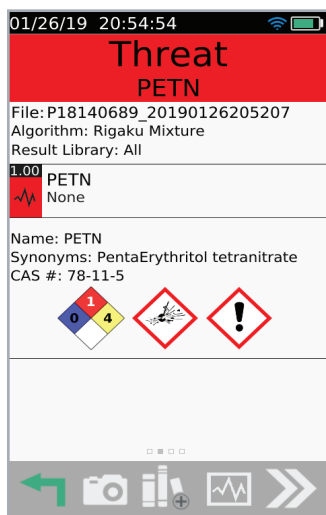
Portable, Rapid and Accurate Identification

Raman systems utilizing 1064 nm laser technology are currently available from Rigaku Analytical Devices. The Rigaku Progeny ResQ and ResQ CQL 1064nm analyzers detect the chemical structure and physical characteristics of its target. Preloaded algorithms then compare the sample's characteristics to the system's database for identification. The Rigaku portfolio of handheld Raman analyzers can identify and distinguish between closely related substances with its onboard and easily expandable database of over 13,000 chemicals and compounds. The system identifies and alerts operators to threat precursors, powders and threats presented in mixtures with benign materials. A vital addition to security screening operations, the Rigaku instrument processes and delivers results in less than 40 seconds to allow for rapid screening of passengers.

The Progeny ResQ and ResQ CQL analyzers are able to screen powders and other substances through packaged materials such as polymer bags, glass bottles, flasks and vials. Being able to detect compounds through containers can be life-saving in the case of carfentanyl, of which can induce a coma or even death from mere contact with skin. Rigaku systems are portable and lightweight to support flexible screening operations and search. The system has been designed for ease of use and contains a comprehensive database of chemical signatures that is regularly and easily updated at no cost for the entire life of the product.

The onboard camera of the Rigaku Progeny ResQ and ResQ CQL 1064nm Raman analyzer also supports law enforcement and the evidentiary collection process by allowing the operator to capture multiple pictures of the sample and surroundings. The images are stored with the analysis in a tamper-proof file. The camera can also be used to capture shipping and product barcodes to enhance investigations and the traceability of origin.

In addition to providing identification of substances in bulk form, the Rigaku ResQ CQL analyzer is the first field-ready handheld Raman tool to also provide trace analysis of narcotics and explosives. With the addition of QuickDetect Technology, users are provided automated colorimetric results for the detection of non-visible trace amounts in seconds.



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