



A77 Comparison of Four Commercially Available Portable Raman Spectrometers

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After attending this presentation, attendee shall be able to describe the operation of all the portable Raman instruments evaluated in this study, explain the strengths and opportunities for improvement of each device, and discuss the limitations of individual instruments and Raman technology in general, with regard to the analysis of controlled substances and explosives.

This presentation will impact the forensic science community by assisting prospective users of portable Raman devices to determine which device may best suit their agencies' needs.

In today's post 9/11 forensic environment, it has become increasingly important that civilian first responders, combat soldiers and forensic personnel have the tools necessary to quickly probe unknown bulk materials for the presence of explosive compounds, explosive precursors, controlled substances and other potentially hazardous materials while in the field. In response to this growing need, several manufacturers have produced portable Raman spectroscopy-based devices that may offer great potential for rapid, non-destructive sample analysis where this type of on-site chemical investigation is required. These devices can be used to identify unknown chemical materials at ordinary traffic stops, crime scenes, clandestine laboratories, airports, borders or on the battle field.

The National Forensic Science Technology Center (NFSTC); as part of its Forensic Technologies Center of Excellence (FTCoE) award from the National Institute of Justice (NIJ), evaluated four portable Raman spectrometers. The instruments included in the evaluation were the ICx Technologies Fido® Verdict™, the DeltaNu® Reporter™, the Ahura Scientific Thermo Scientific FirstDefender RM and the Smiths Detection RespondeR RCI. This assessment was conducted to provide potential users of this type of portable Raman technology with independent and unbiased technical information on each of these devices. Each spectrometer was tested separately using the same standardized systematic evaluation scheme to assess individual strengths, areas for improvement, limitations, GUI interfaces, and safety issues, as well as the entire chemical characterization process involved from sample introduction through result output for each device. Representative samples of controlled and non-controlled drugs (standards and adjudicated case samples), drug diluents, ignitable liquids, explosives, explosive precursors, common household materials, and compounds sharing similar chemical composition were used to assess each unit for conformity, reproducibility, ruggedness, specificity, portability and mixture sensitivity. Samples were analyzed in triplicate and the resulting data and evaluator observations were recorded.

These rugged, portable field units are specifically designed to provide law enforcement, airport security, border patrol, military, emergency service personnel and other first responders with the ability to perform analysis on unknown bulk powders and liquids containing compounds such as illicit and pharmaceutical drugs, explosives, ignitable liquids, oxidizers, industrial chemicals and common household materials. Evaluation of these portable Raman spectroscopy instruments is critical to the advancement of forensic science, homeland security efforts, and

military operations. These devices hold the promise of empowering first responders with crucial forensic intelligence, enabling them to make the best decisions to preserve public safety. They have further potential to help reduce the burden on overtaxed crime laboratories, by effectively screening out and prioritizing evidence before forwarding it to the forensic laboratory for additional testing.

Raman, Spectrometry, Portable