Application Note 410000052-A

# See-Through Measurements of Illicit Substances in Commercial Containers with the TacticID®-1064 ST

The TacticID®-1064 ST is a 1064 nm handheld Raman system designed for law enforcement officials, first responders, and customs and border protection officers for rapid field identification of illicit materials such as narcotics, explosives, and other suspicious materials. The TacticID-1064 ST has dedicated software and hardware designed to measure materials through both transparent and opaque containers. These through-barrier measurements remove the need for active sampling of potentially dangerous compounds, such as fentanyl, leading to safer operations and reduced wait time for clear results. The 1064 nm laser is also an advantage for analyzing fluorescent or impure material. A Raman system with a 785 or 830 nm laser may generate fluorescence from these samples, which can overwhelm the Raman signal and make identification impossible. In this application note, we'll explore some of the capabilities of the TacticID-1064 ST.

## EXPERIMENT

The TacticID-1064 ST is equipped with a See-Through (ST) mode scan function that allows users to identify chemicals behind thick and opaque barriers with the use of an ST sampling adapter (Figure 1). A hit quality index (HQI) is used to match the unknown sample to a library spectrum. The HQI calculation ranges from 100 (best match) to 0 (worst match). The system employs an automatic integration time. The laser power is adjustable, but was set to 90% for these measurements. The number of hits can also be adjusted.

Materials tested:

- Fentanyl - highly toxic opioid that is often mixed with heroin and other street drugs
- N-acetylanthranilic acid – US DEA List I controlled drug precursor, used in synthesis of methaqualone, highly fluorescent with 785 nm excitation
- Caffeine - stimulant often used as a cutting agent in drug manufacturing

Containers:

- manila envelopes
- padded shipping packages
- high-density white polyethylene (HDPE) bottles




**Figure 1.** TacticID-1064 ST measuring a sample through a manila envelope with ST adapter

## RESULTS

Fentanyl citrate powder inside a thin, plastic bag was placed inside of a manila envelope and tested with the TacticID-1064 ST. Fentanyl citrate was successfully identified directly through the manila envelope with an HQI of 85.0 (Figure 2).

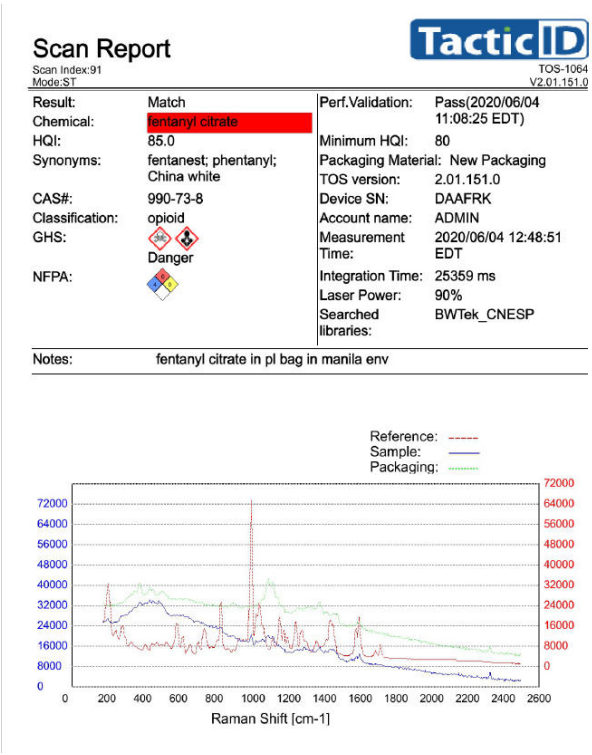



**Figure 2.** Fentanyl match report for sample measured through manila envelope

N-acetylanthranilic acid is a light brown compound that is used in the synthesis of methaqualone and mecloqualone, both Schedule I drugs. According to the International Narcotics Control Board (INCB), 10.4 metric tons of N-acetylanthranilic acid has been seized globally since 2000. When measured with a 785 nm laser, the Raman signal is completely overwhelmed by the generated fluorescence (Figure 3, red trace), making identification impossible with Raman. The 1064 nm laser of the TacticID-1064 ST does not generate fluorescence (Figure 3, blue trace), and a good Raman spectrum can be collected and used for identification against the spectral library.

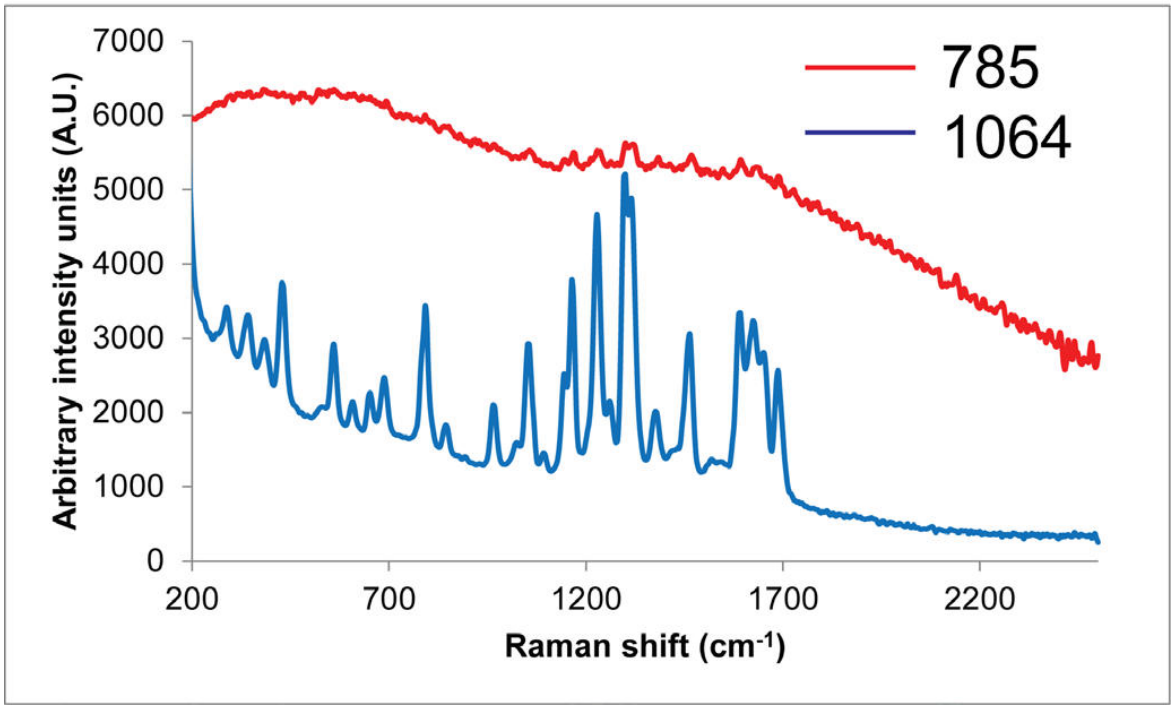



**Figure 3.** Comparison of Raman spectra of N-acetylanthranilic acid with (a) 785 nm and (b) 1064 nm laser excitation.

The ST mode on the TacticID-1064 ST was used to measure N-acetylanthranilic acid through a white plastic (HDPE) bottle with an HQI of 92.2 (Figure 4).

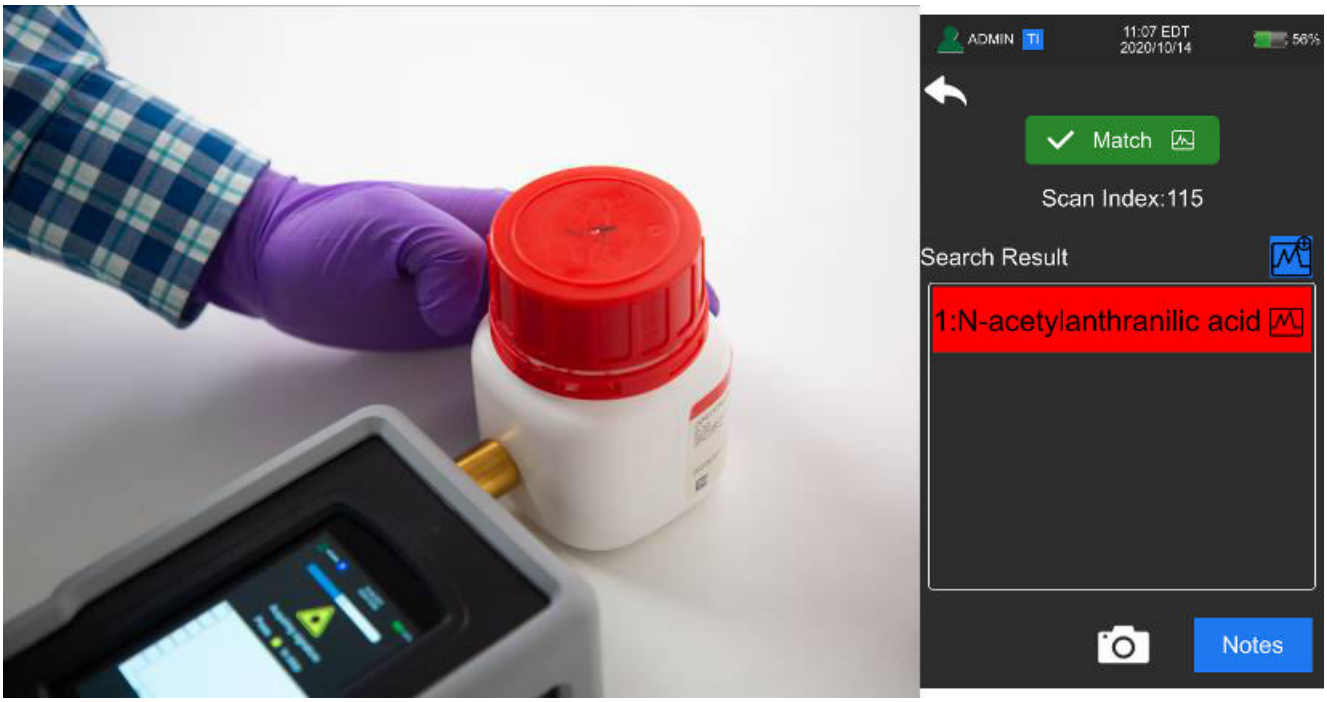



**Figure 4.** TacticID-1064 ST measurement through HDPE bottle and match result for N-acetylanthranilic acid

Caffeine in a white plastic bottle was placed inside a white padded shipping package for analysis (Figure 5). In this case, the caffeine must be identified through both the plastic and the padded package.

The ST mode on the TacticID-1064 ST was able to successfully identify the caffeine through the padded package and plastic bottle with an HQI of 91.3.




**Figure 5.** Measurement of white HDPE bottle of caffeine inside white padded package

## CONCLUSION

The TacticID-1064 ST puts operator safety first, removing the need to actively sample from opaque packaging in order to identify illicit substances. The 1064 nm laser excitation removes fluorescence issues generally associated with 785 nm Raman systems.

## CONTACT

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## CONFIGURATION




TacticID-1064 ST

The TacticID®-1064 ST is a 1064 nm handheld Raman analyzer for rapid field identification of explosives, narcotics, and other suspicious materials. The see-through capability of the TacticID-1064 ST can nondestructively analyze samples through opaque and transparent packaging, with sample threat level displayed prominently for first responders, safety personnel, law enforcement, bomb squads, customs and border protection, and hazmat teams to act quickly with minimal sample contact.

The TacticID-1064 ST utilizes proven Raman spectroscopy, in combination with patented STRaman® technology, allowing users to get real-time actionable identification of unknown chemicals, narcotics, pharmaceutical drugs, explosives and many other substances even through opaque barriers, significantly reducing operational uncertainty and response time.

The TacticID-1064 ST with 1064 nm laser excitation and ST adapter for see-through applications scans a large sample area, producing a fluorescence-free spectrum with no sample burning, allowing users to identify dark and colored materials, tough street samples, inhomogeneous mixtures and materials directly through packaging.

This IP68-rated system features a high brightness display with touchscreen and/or hardware button interface for ease of use even through protective gear.