

RAPID IDENTIFICATION OF NEW PSYCHOACTIVE SUBSTANCES USING 1064nm HANDHELD RAMAN

- Results in the field, in seconds
- Identify a wider range of compounds
- Analyze substances in packaging



NPS: A COMPLEX AND DIVERSE GLOBAL HEALTH THREAT

Available through many sources, including the internet, new psychoactive substances (NPS) continue to rapidly emerge on the global market at an unprecedented rate. According to the World Health Organization (WHO), these substances pose “a threat to human health and well-being.”¹ Illegal or marketed as pure ‘legal highs’, effects mimic traditional drugs. Global reporting of newly introduced NPS preparations is a growing challenge along with full knowledge of the health dangers and social ramifications.

NPS compounds are synthesized using of a number of chemical, pharmaceutical and dietary supplement components. In one study, 8 out of 10 NPS products purchased online were found to contain ingredients and impurities inconsistent with the product labeling.²

Rapid identification in the field is a vital component to determining if substances are legal or illegal, reducing supply and collecting data on emerging NPS mixtures and use trends. However, identification and detection continues to be an issue because of varying complex/diverse mixtures and similarity to like-drugs.

HANDHELD RAMAN: 1064nm OVERCOMES ANALYSIS LIMITATIONS

The benefits of handheld Raman technology for chemical identification in the field are well known. Handheld Raman systems have evolved in recent years. Studies utilizing new generation Raman technology demonstrate the advantages of longer wavelength systems, “it is recommendable to focus on 1064 nm systems because a lot of NPS cause fluorescence with 785 nm systems.”³

Sample-induced fluorescence interference is naturally occurring, especially with chemicals that are impure and colored.

Fluorescence limits accurate and timely chemical identification by overwhelming the chemical’s “signature” spectral peaks. It is experienced most frequently on 785, 830 and 1030 nm based Raman systems.

Figure 1 shows results from a comparative analysis of SNOW performed as part of the “Spice II plus” project.³ The 1064 nm Progeny analyzer generated clear spectral peaks.

Analysis was performed through a plastic bag.

Another study found “pharmacological inactive ingredients (such as MCC) fluoresced and masked the overall signal of the NPS product when measured using a 785 nm wavelength laser.”²

Figure 2 shows comparative results of MCC analyzed with a 785 and 1064 nm handheld Raman system.

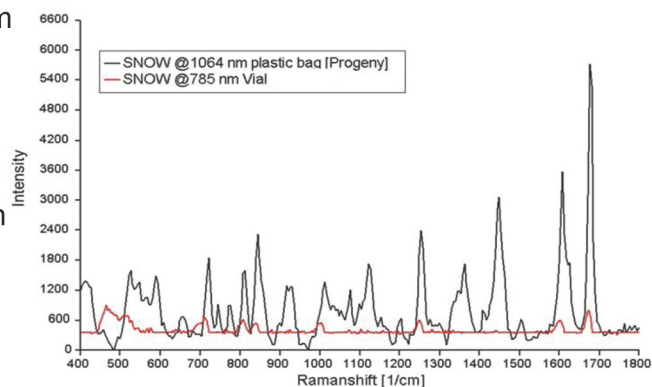


Figure 1

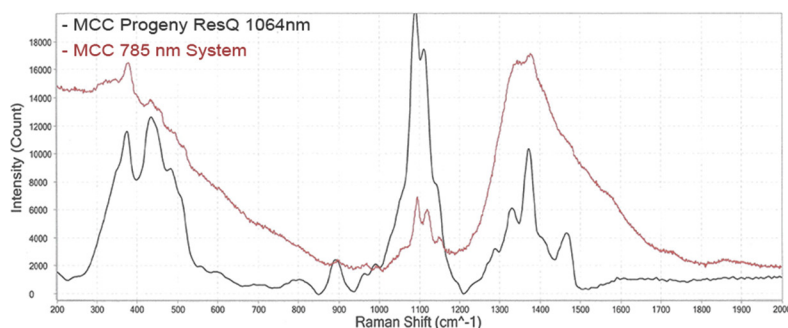


Figure 2

NPS IDENTIFICATION: ACCURACY AND EFFICIENCY

“Post processing of raw data can cause identification problems.”⁴

It is important to note that some spectral massaging techniques/algorithms actually result in loss of critical spectral peaks required for positive NPS identification. Progeny ResQ 1064nm handheld Raman better identifies the true chemical fingerprint, resulting in accurate and timely compound identification.

In another study by Waynesburg University, a handheld Raman unit utilizing a 785 nm laser excitation source reported scan times of up to 29 minutes for a single sample.⁵ In comparison, Progeny ResQ results are provided in under 2 minutes, with the majority of results in under 1 minute.

DATA AND USER TRACEABILITY

Traceability is essential for protecting the integrity of analysis results. To meet this requirement, Progeny ResQ ensures integrity by recording and retaining the complete history of any and all changes made to the device. Substances cannot be deleted from the master library. Additions to custom created user libraries are recorded and retained. User activity is tracked. All data is stored in non-editable files that cannot be accessed or altered to prevent accidental or intentional corruption.

EXTENDING THE UTILIZATION OF THE CHEMICAL IDENTIFICATION DEVICE

With the introduction of new handheld Raman analyzers, integrating additional capabilities expands utilization and provide the best return-on-investment for users. Features like an onboard camera for documenting samples, an easily expandable library, and rapid data transfer all extend the usefulness of the device. Additionally, items like a 24-month warranty, library and software updates, installation training, support and reachback service help agencies and end users conserve funding and reduce reliance on future grants necessary to fund instrument upgrades and support.

CONCLUSION

The chemical specificity and mobility of Progeny ResQ 1064nm handheld Raman makes it an effective device for the identification of NPS compounds. Numerous studies have proven that 1064nm laser excitation provides distinct advantages for accurate and timely substance detection. With it's unique integrated features and advanced analytics, Progeny ResQ expands field analysis and supports efforts to reduce the supply of new psychoactive substances from the marketplace, helping to ensure public safety.

REFERENCES

1. Executive Board 139th session. World Health Organization. 27 May 2016. http://apps.who.int/iris/bitstream/10665/250813/1/B139_12-en.pdf?ua=1.
2. Sulaf Assi, David Osselton, Bethany Wallis. (2016). The Evaluation of Dual Laser Handheld Raman Spectroscopy for Identifying Novel Psychoactive Substances. American Pharmaceutical Review.
3. Amira Guirguis, Sarah Giroto, Benedetta Berti, Jacqueline L. Stair, Abstr Identification of new psychoactive substances (NPS) using handheld Raman Spectroscopy employing both 785 and 1064nm laser sources., Forensic Science International <http://dx.doi.org/10.1016/j.forsciint.2017.01.027>
4. Sarah Harkai; Michael Putz. Comparison or rapid detecting optical techniques for the identification of New Psychoactive Substances in 'Legal High' preparations. Society of Toxicological and Forensic Chemistry Proc: XIX. GTFCH-Symposium, 16.-18.04.2015. Toxichem Krimtech Jahrgang 39- Band 82 Special Issue (April 18, 2015); https://www.gtfch.org/cms/images/stories/media/tb/tb2015/Harkai_Putz_2015.pdf
5. Kimberly Patnaude, Michael Cipoletti,. Portable Raman Analyzer's Performance In The Detection of Controlled Drugs. Waynesburg University. <http://www.waynesburg.edu/docman/73-portable-raman-analyzers-performance-in-the-detection-of-controlled-drugs/file>



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