



Breeze™ — A Safer and Faster Way for Illicit Drug Detection

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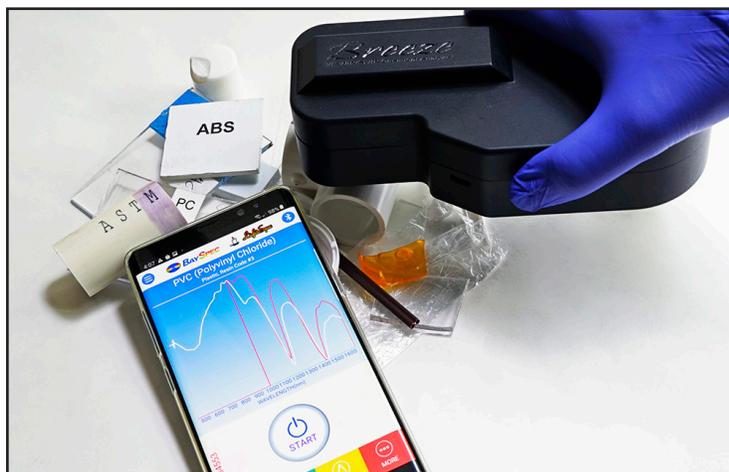


Figure 1 - BaySpec Breeze™ - Dual IS with a micro integrating sphere

Public and first responder safety is paramount in scenarios where exposure to dangerous substances is a possibility and their constitution must be confirmed.

Illicit and dangerous substances are ubiquitous in ports and prisons across the globe, in addition to turning up in private residences, checkpoints, or traffic stops. Everywhere law enforcement and other first responders operate, they risk exposure to such substances, from fentanyl (a synthetic opiate painkiller) and synthetic cannabinoids (lab-produced compounds whose makeup can vary significantly from batch to batch)

to phosphorous and other chemicals that react violently when exposed to open air.

Inhalation, ingestion, or even incidental contact with these substances can have serious medical repercussions (e.g., hypoventilation from opioid intoxication) in humans as well as animals (e.g., police “drug sniffing” dogs). While debate exists regarding the true medical impacts of exposure to these substances and the amount of a

given substance necessary to elicit a serious response,^{1,2} there is consensus in the idea that minimizing or eliminating exposure to illicit and dangerous substances is optimal. Still, first responders (including medical personnel who need an idea what they may be treating) have a daily need to test unknown substances in the name of preserving public safety and enforcing the law.

The question for these individuals then becomes, how do we test these substances without jeopardizing our own safety? Most current testing methods fall short in terms of accuracy, safety, timeliness, or cost effectiveness. BaySpec’s Breeze™ Smart Palm Spectrometer overcomes these challenges and provides first responders, guards, customs workers, and more with a viable handheld solution to identify unknown substances.

How Current On-site Detection Methods Fall Short

Law enforcement personnel often field test substances/evidence by scooping a bit of powder into a field drug-testing kit, which changes color depending on the type of drug present, if any. However, many police departments now discourage or prohibit such “color tests” in the field.



Figure 2 - Counterfeit Pain Pills Containing Potentially Deadly Chemical



Figure 3 - BaySpec Breeze™ Series

While this testing method is sufficiently reliable, it can only test small portions of a substance at a time, meaning multiple tests will be necessary to identify substances in multiple packages. Each test also includes a per-use cost because of the test paper or solution used to conduct it, and certain test strips/solutions only test for particular substances, meaning the user must have an idea what they are looking for before conducting the test. Finally, users of this method need to open the substance's packaging, risking exposure to an unknown (or known-to-be-dangerous) drug or substance while simultaneously risking destruction of evidence through the testing process.

Alternatively, officers may send the suspected drugs to a crime lab. Negative test results can be returned within 24 hours, but positive results require additional screening for confirmation, which can take between a few days and a week. This timeline exceeds most laws dictating how long a person of interest may remain in law enforcement custody without being charged, complicating the process of securing a search warrant or making arrests related to the substance.

Finally, first responder vehicles might be outfitted with substance testing instrumentation that, while effective and moderately convenient, is bulky, costly, and difficult to power. This solution also does nothing to eliminate responders' physical contact with potentially dangerous substances.

Each of these options is costly in terms of both time and money. Some require specialized expertise to manage the instrumentation, and none of them are conducive to minimizing or eliminating the need for officers to touch potentially dangerous substances directly. Thus, there exists a need for a cost-effective, convenient means for law enforcement and other first responders to quickly and accurately test unknown substances while also protecting them from physical contact with those substances.

How Breeze™ Ensures Accuracy And User Safety

BaySpec's Breeze™ is a handheld device that allows the user to perform highly efficient spectroscopic analysis with maximum sensitivity and ultrafast acquisition. Breeze allows users to scan materials without removing them from their container in most cases, as it requires no sample preparation, limiting the risk of user exposure to unknown substances and preserving evidence that might be destroyed or lost using traditional testing methods.

This no-contact testing is achieved with one-button operation that performs spectral matching automatically to achieve the recognition immediately, drawing from a constantly expanding substance library/database and applying AI chemometrics. Since the substance library is built into the Breeze, operators can use the point-and-shoot

device with no prior training or expertise in substance analysis (e.g., how to read a mass spectrometer readout).

The Breeze™ series has full EM spectrum coverage from 400 nm to 2500 nm, a range that allows for identification of illicit drugs and other pharmaceuticals, as well as foods, biological warfare agents, and explosives. The wider, longer wavelength range is achieved by deftly packaging multiple miniature spectrographs inside the handheld device.

BaySpec also recently upgraded several Breeze models to a Dual-IS (Integrating Sphere) version, slightly increasing their size but empowering the devices to provide much more accurate and detailed spectral information. Dual-IS versions of Breeze can measure diffuse reflection of a material's surface and average all angles of illumination.

Finally, BaySpec Breeze™ allows materials analysis to be conducted anywhere at any time, eliminating the need for laboratory testing and waiting for results. Breeze comes equipped with a rechargeable battery and can wirelessly connect to any smartphone via a Bluetooth interface. The corresponding phone app also allows users to set up their own databases for sample analysis.

To learn more, visit us at <https://www.bayspec.com/spectroscopy/breeze-smart-palm-spectrometer/>

References

1. Melamed, Samantha. "Pa. Prisons Spend \$15M after Guards Were Sickened by K2. But What If It Was Just in Their Heads?" <https://www.inquirer.com>, *The Philadelphia Inquirer*, 7 Sept. 2018, www.inquirer.com/philly/news/pennsylvania-department-corrections-prison-lockdown-drugs-k2-fentanyl-guards-sickness-20180907.html.
2. United States Drug Enforcement Agency (DEA) *Fentanyl Warning to Police and Public* (June 2016)

Additional Resources

- United States Centers for Disease Control (CDC) *Guidance on Preventing Emergency Responders' Exposures to Illicit Drugs* (February 2020)
- American College of Medical Toxicology (ACMT) *Statement on Fentanyl Exposure* (July 2017)
- ACMT and American Academy of Clinical Toxicology (AACT) *Position Paper on Fentanyl Exposure* (July 2017)

About The Authors

Michael Li is a marketing specialist at BaySpec, Inc. Michael graduated from the University of South Florida with a master's degree in marketing. He is proficient in marketing research and marketing management and excels in observing, analyzing, and overcoming marketing challenges.

William Yang is a co-founder and the current Principal Technologist of BaySpec Inc. William holds three degrees in laser physics, electro-optics, and laser spectroscopy. A self-made technical entrepreneur who learned management, financial, and business skills through Silicon Valley's real-world working practices, William holds more than 36 U.S. patents and is the originator of more than nine different product lines based on photonics.

About BaySpec, Inc.

BaySpec, Inc., founded in 1999 and with 100 percent US-based manufacturing, is a spectral sensing company headquartered in Silicon Valley. BaySpec designs, manufactures, and markets advanced spectral instruments, including smart handheld spectrometers, Raman spectrometers, a new class of OCI™ hyperspectral imagers, novel transportable mass spectrometers, high-performance UUVIS-NIR-SWIR spectrometers, and OEM spectral engines. BaySpec also creates components intended for precision agriculture, R&D, biomedical applications, pharmaceuticals, chemical, food, and semiconductor analysis, health monitoring, and the optical telecommunications industry.

