Immunoassays use the principles of competitive binding between the antigen (target drug such as fentanyl) and antibodies of the test strip pad. They offer reliability and low limit of detection (LOD), however are largely qualitative and prone to either false positives with structurally similar compounds or false negatives due to the diversity of drugs within a class.

“IMMUNOASSAYS OFFER A CONVENIENT, FAST, AND LOW-COST TESTING METHOD, USEFUL FOR OUTREACH AND AT-HOME USE.”

Raman Spectroscopy

With Raman Spectroscopy, a laser in the visible light region is focused on a sample which scatters some of the light. This light shifts after contact with the sample and provides a molecular fingerprint. Significant challenges of Raman spectroscopy are sample fluorescence due to dyes and similar issues with lack of sensitivity that Infrared (IR) spectroscopy faces.

Surface Enhanced-Raman Spectroscopy (SERS)

SERS amplifies Raman scattering via metal nanoparticles in solution to detect trace level components. This method also reduces fluorescence, however its sensitivity can be lowered in complex mixtures as shown above. It also requires significant method development and validation for each specific application.

Gas Chromatography-Mass Spectrometry (GC-MS)

GC–MS is useful as a point-of-care drug checking instrument as it offers trace-level identification. However, it has a relatively high instrumental and operational complexity. Mass spectrometry data enables us to benchmark the performance of portable instruments and pursue further method development.

Multi-Instrument Approach to Drug Checking

“IN THE CONTEXT OF INCREASINGLY COMPLEX SUBSTANCES AND UNPRECEDENTED LEVELS OF ILLICIT DRUG OVERDOSE, THERE ARE SIGNIFICANT ADVANTAGES TO A MULTI-INSTRUMENT APPROACH TO DRUG CHECKING.”

Out-of-the-box technology is not currently meeting the needs of service providers and a multi-instrument approach may be required to respond to expectations of drug checking services. Recognizing limitations, consideration of different instrument demands and contexts, and integrating instrument knowledge will establish trustworthy and effective service.

To learn more about our unique drug checking project, visit substance.uvic.ca