Problem Statement:

Current technology limitations with chemical analysis tools (e.g., GC-MS, Raman, FT-IR and basic colorimetric, etc.) preclude stakeholders from leveraging appropriate sample method throughput, efficiency of reproducibility, and fidelity of results. Enhancing the ability to detect and identify chemical signatures of interest using commercially available instrumentation and techniques, and sharing between instruments and other agencies is critical to mission success.

In addition to current limitations, no authoritative common data-format standard exists for chemical signatures to enable the creation of new databases or converting existing databases for current and/or future discoverability.

Effective Outcome: Reduced analysis time and interaction of user, increase reproducibility, simplicity, specificity, and confidence level. Providing outputs that can be analyzed for signatures, for databasing and further analysis.

Unique Conditions: Size, weight, complexity, price, performance, and level of scientific knowledge of the operators.

Standards/Desirements: Improve detection (e.g., increase sensitivity and lower levels of detection), reduced sample preparation time, increase reproducibility, possible automation, and increase chemical detection in complex sample matrices. Decrease the number of procedural or sample preparation steps.

Technology Research Areas of Interest: Separation techniques, solid-phase extraction techniques, headspace sampling, and/or chemical extraction procedures. Evaluation and validation processes to identify optimal techniques for obtaining the goal of signature identification. Complimentary or alternative, fieldable chemical identification and elemental analysis tools that are not currently fielded.