

FROM SENSING TO MAKING SENSE

Building On Fentanyl Analog Independent Detection (faid) For Other Novel Challenges

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Sandia National Laboratories, in response to the ongoing fentanyl crisis, has developed an analog independent detection technique based on directed thermal decomposition with comprehensive two-dimensional gas chromatography and ion mobility spectroscopy detection (GCxGC-IMS). This technique uses patterns produced by the thermal fragmentation of the opioid targets to identify both fentanyl and its analogs. Since 2020, DTRA has funded an effort to build an instrument around this technique that expands the capability and specificity by coupling a positive and negative mode IMS detector to the instrument, as well as a new pyrolytic inlet that uses consumable surface swipes to sample the environment. This system has been demonstrated to detect fentanyl and its analogs as both neat chemical compounds and in trace levels in the presence of common cutting or adulterating agents (i.e. acetaminophen, procaine, lactose, and baby formula).

This capability enables a warfighter encountering a white powder, a suspicious package, or a suspected production facility to know if the compound is a fentanyl analog, even if the analog is novel. The system detection limits are still being evaluated, but trace detection capability is expected. Limited chemical consumables replaced on a monthly or better cadence is expected. The prototype system is battery powered and push button operated. It is less than 3L and 5 pounds with additional SWAP reduction possible dependent on operational considerations.

Recent feedback from warfighters this past spring emphasized the importance of the capability, but also stressed the need for expanding the capability of such a system to tackle a wider target set to reduce equipment burden. Toward that goal, new ideas of how this system can be used to detect explosives and other targets such as CWAs, NTAs, and PBAs will be presented.