

Monitoring Clandestine Activities by the Mini 12

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The Mini 12 mass spectrometer, a Purdue University homebuilt portable linear ion trap has many applications within the forensic community. With full control of the Mini 12, unlike commercial ion traps, new scan methods and ways of fragmentation can be accomplished. Multigenerational collision induced dissociation can iteratively fragmenting ions to perform MSⁿ in a single scan for improved confirmation of analytes of interest, such as isobaric drugs of abuse. Similarly, both the analyte of interest and the internal standard can be isolated and simultaneously fragmented on a single ion packet. These two scan methods are easily performed on the Mini 12 due to control of the SWIFT waveform that isolates the ions, as well as, the RF and AC frequencies and amplitudes which are required for trapping and fragmenting the ions. These projects have focused on the detection of illicit drugs as standards, as well as in dried blood spots through paper spray ionization. The Mini 12 has been used in other clandestine monitoring techniques; such as identifying a specific individual who discharged a firearm through swab touch spray. The identification of a suspected shooter in the harsh environment has major advantages from a criminal investigation standpoint. Ambient ionization seamlessly couples to portable instrumentation and the Mini 12 has been capable of analyzing drugs, explosives and chemical warfare agents by paper spray ionization on a paper substrate that is coated in nanoparticles for surfaced enhance Raman spectroscopy. This is vital because forensic analysis requires an identification test, as well as, a confirmation test. With paper spray being amenable to portable instrumentation, and portable Raman spectrometers are commercially available, the entire identification and confirmation of a forensic substance can be performed solely in the field or harsh environment on a single substrate.