B77 The Rapid Non-Destructive Identification of Drug Tablets Using Single Particle Aerosol Mass Spectrometry

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Upon completion of this presentation, attendees will have learned the operating principles and broad application range of Single Particle Aerosol Mass Spectrometry. Attendees will be aware of a new promising technique for the non-destructive analysis of drug tablets.

This research will show a novel method of non-destructively identifying drug tablets in real-time. This presentation will impact the forensic community by providing a new, efficient and accurate method to identify drugs with high throughput. Humanity will be best served if techniques such as SPAMS are used to identify drugs and prosecute those who synthesize and traffic drugs.

This presentation will demonstrate the ability to detect drug tablets in a real-time, non-destructive manner using Single Particle Aerosol Mass Spectrometry, a technique that has been developed for homeland security applications including biological, chemical, and explosives detection.

The rapid identification of drugs is essential due to the high number of cases involving drugs and large sample volume commonly seized by law enforcement. The ideal detection system would provide instant information about the components in a suspected drug tablet as well as information that may aid law enforcement to prosecute those involved in illegal drug synthesis. Commonly, visual information, such as size, color, shape, and imprint, is used for such attribution, so the ideal detection scheme would keep such information intact during analysis.

Single Particle Aerosol Mass Spectrometry (SPAMS) is an on-line detection system that individually analyzes single particles. In the SPAMS system, each individual incoming particle is tracked and sized by laser light scattering before a short energetic pulse from a laser (266 nm) desorbs and ionizes the molecules. Time-of-flight mass spectra from both positive and negative ions are recorded simultaneously and are analyzed and classified at a rate of 20 particles per second. SPAMS is capable of low concentration detection of target particles in a high background environment, and has previously been applied to the detection and identification of viruses, toxins, fungi, Mycobacteria, *Bacillus* spores, explosives, and chemical agents. The real-time data analysis program used in conjunction with SPAMS allows the facile and immediate identification of threat compounds, presenting SPAMS as a viable point detection system for airport screening, personnel screening, ambient air analysis, or border control. In addition to these homeland security applications, SPAMS can also be used for forensic analyses. It was hypothesized that SPAMS would provide a non-destructive, fast, simple, sample preparation-free method of analyzing drug tablets. Over- the-counter drugs were analyzed as a proof-of-concept study for illicit drug detection. A single drug tablet was placed in a glass vial modified with tubing to transport particles to the instrument. By shaking the glass vial, particles were dislodged from the tablet due to collisions with the sampling container. These particles were sampled into the instrument and analyzed in real-time without destroying the identifying characteristics and markings of the tablet. Batch analysis of multiple tablets was possible by placing multiple tablets into a single glass vial. Mass spectral data from studies involving several over-the-counter drugs will be presented and SPAMS will be discussed as a prototype universal particle detection system and a promising forensic technique.

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Drug, Mass Spectrometry, Real-Time

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