

MS for Trace Explosives Detection in Aviation Security

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The FAA has funded the development of a small dual mode ionization mass spectrometer for the trace detection of a broad range of terrorist threats. The detector was developed by Syagen Technology, Inc. (Tustin, CA) and employs a dual ionization source for detection of explosives and chemical agents, which requires both negative and positive ion sources. The mass analyzer is a high performance ion trap, time of flight mass spectrometer, which provides for ms-ms capability. The performance criteria on which aviation security screening technologies are judged include accuracy (high detection and low false positive rate), speed, cost and reliability. The environment in the airport can be conditioned as in the terminal but can also be dirty and subject to extremes in temperature as in the cargo and checked baggage areas. This detector has been integrated into a personnel portal developed at Sandia National Laboratories under funding by the FAA. The key in the integration included preconcentration steps to handle large volumes of air samples. Particles and vapor have to be collected from literally several thousand liters of air volume and then introduced into a vacuum. This has to be accomplished in a time frame that is conducive to acceptable passenger flow. Additionally, it was necessary to automate the process and make it simple to operate. The portal is now under testing at the FAA Trace Explosives Laboratory at the Aviation Security Laboratories of the William J. Hughes Technical Center. This presentation will describe the development and integration of these projects, their integration, and the progress to date, and future direction in the miniaturization of mass spectrometry.