

A Ruggedized, Field Deployable Mass Spectrometer System for Detection of Chemical Warfare Agent Simulants Distributed by Realistic Mock Weapons Systems

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The threat of chemical warfare agents (CWA) spread via explosives or other means is an ongoing concern, and MIT-LL has developed a real-time, vapor sensing mass spectrometer system to help characterize the phenomenology of these threats. The system consists of a laboratory grade Thermo LTQ XL mass spectrometer, modified for detection of vapors and housed in an all-weather, temperature controlled environmental enclosure. This enclosure has been designed to allow the delicate instrumentation inside to withstand the shock of nearby explosions. In addition, the system has been designed for remote operation (up to two months at a time) without hands-on user intervention or maintenance. Other innovations include a manifold of selectable sampling lines (to mitigate the effects of contamination), a self-cleaning capability and the ability to perform vapor calibration of the instrument in the field.

The described system has participated in numerous field phenomenology tests of CWA simulants distributed by an array of realistic mock weapons systems, including explosive devices in close proximity to the mass spectrometer. Field data will be shown for two CWA simulants, namely tris(2-ethylhexyl) phosphate and stearic acid, for which concentrations have been recorded at the ppb level.

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