

THREAT AGENT DEFEAT MODELING AND TESTING USING WMD SIMULANTS

Single-shot Standoff Hyperspectral Raman Imaging Of Diisopropyl Methylphosphonate

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Threat agent defeat relies on diagnostics to (1) identify the presence of agents, (2) determine the behavior of agents during defeat, and (3) verify the neutralization of agents. Some defeat approaches rely on rapid heating in difficult to monitor environments, posing challenges for existing diagnostics. Ideally, the diagnostic used in such situations will be capable of: (1) uniquely identifying specific compounds, (2) measuring/monitoring a large spatial area, (3) perform measurements very quickly, and (4) perform measurements in a standoff configuration.

Diagnostics that meet all these requirements are limited. For example, hyperspectral Raman imaging can be used to identify materials but typically requires some time to complete the measurements. Fast measurements, including single-shot standoff Raman spectroscopy measurements have been reported, but without the ability to image the sample.

Using two different approaches, we have now demonstrated the capability to perform Single-shot Standoff Hyperspectral Raman Imaging (S3HRI) of a chemical warfare agent simulant, liquid diisopropyl methylphosphonate (DIMP) at a standoff distance of 1 m. The two approaches are multi-bandpass filter imaging (MBFI) and Fiber-bundle Imaging Spectroscopy (FBIS). We will discuss these two approaches, including their advantages and disadvantages and their potential for applications in agent defeat scenarios.

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