

QUANTUM TECHNOLOGIES, METAMATERIALS, AND THE FUTURE OF CB SENSING

Assessment of Surface and Ground hAzards by Real-time Detection (ASGARD) – Proximate Chemical Agent Detector (PCAD)

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The real-time detection of chemical contamination, on ground and surfaces, is vital to the protection of the warfighters, as well as informing avoidance and mitigation strategies for the commanders. However, the ability to perform these actions in a standoff posture is still a challenge being addressed by S&T defense communities. Traditional methodologies center around point detection devices that require sample manipulation of potentially hazardous materials which increase the probability of secondary exposure to the user. Over the past decade, optical detection technologies have continued to mature through industry, academia, and government agencies to provide new options in assessing chemical hazards both in bulk presentation forms and potentially in lower-level chemical presentations on contaminated surfaces and ground.

The Defense Threat Reduction Agency (DTRA) along with support from the Joint Project Manager for Chemical, Biological, Radiological, and Nuclear Sensors (JPM CBRN Sensors) has executed the Proximate Chemical Agent Detector (PCAD) program to specifically address detecting solid and liquid hazards on various surfaces in all environmental conditions in order to assist the warfighter during operation and to enhance decision making in the field. The PCAD is intended to be portable (hand-held) with the ability to scan and quickly detect a chemical, alerting a warfighter to the location of a threat ranging from bulk down to trace/non-visible by eye.

Currently two developmental tracks are being explored under the PCAD; Track 1 (non-Trace): Non-contact detection/identification of visible/bulk materials and Track 2 (Trace): non-contact detection/identification of trace/non-visible samples.

The Pendar X10 from Pendar Technologies is a short-range standoff Raman detector that was selected for Track 1 development and enhancement through the PCAD program. The system utilizes a technique known as differential Raman spectroscopy in which two lasers with different but close wavelengths are measured, and the spectra are subtracted from each other to remove background light and fluorescence. It is designed to detect through transparent barriers to assist with the handling of hazardous materials.

Two vendors were selected to address standoff detection of non-visible hazards on surfaces. Pendar Technologies and a partnership between Block Engineering and Smiths Detection. The systems will be designed to locate and detect micron size particles of solid contamination, as well as liquid droplets and residual material.

We will present an overview of the surface and ground chemical contamination challenge along with summary of the assessments being performed in support of the ASGARD program at DEVCOM Chemical Biological Center.

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