FROM SENSING TO MAKING SENSE

Wearable Chemical Detector For Aerosolized Threats

J. Andrew Kouzelos Design West Technologies, Inc. **Alyssa Telepnev** Design West Technologies, Inc. **William Mao** Design West Technologies, Inc. **Wei Li** Design West Technologies, Inc. **Maria Bauer** Design West Technologies, Inc. **Ramesh Palanisamy** Design West Technologies, Inc. **Ryan Hur** Design West Technologies, Inc.

Traditional Chemical Warfare, Pharmaceutical Based and Non-Traditional Agents (CWAs, PBAs and NTAs) contain substances that have high melting points and low volatilities which are delivered as a solid or liquid aerosols to the intended target. A person-wearable detector system that integrates sample collection, preparation, and proven sensor technology is therefore well aligned with the critical missions of various operational components of the DHS, DoD and the broader first responder communities. Design West Technologies, Inc. (DWT) contracted by the Department of Homeland Security (DHS) Countering Weapons of Mass Destruction Office (CWMD) is currently developing a wearable chemical detector, integrating aerosol collection and processing module as well as carbon nanotube-based (CNT) sensor array. This approach utilizes a fan blower to collect aerosols, and a small heated mesh to improve vaporization of aerosols for uniform presentation to the CNT array allowing for the detection of both vapors and aerosols by the CNT array. Preliminary proof-of-concept results for aerosol detection and threat classification by CNT sensor array system as well as the implications of these results on the design of a personal wearable detector are presented in this poster presentation.

To obtain additional data for characterization of chemical threats, DWT is evaluating commercially available sensing technologies such as optical particle detectors and metal oxide volatile organic chemical (VOC) sensors, temperature and humidity sensors. By integrating these additional sensing technologies information concerning the physical form of a threat as well as its chemical classification is gathered. Based on this data DWT is developing a sensor fusion approach for a chemical characterization across a broad range of aerosolized threats. In the future wearable sensors will be integrated with CBRN reporting software tools (i.e., ATAK) to build a more comprehensive picture of dynamically evolving chemical threats.

This work is supported by the U.S. DHS CWMD under the Small Business Innovation Research (SBIR) program under Award Number 70RWMD22C00000007 (CWMD.SBIR@hq.dhs.gov). The content of the information does not necessarily reflect the position or the policy of the Government and no official endorsement should be inferred.