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Introduction

Perhaps it was providence, or just good timing, that the 100th Anniversary of the first use of industrialized gases occurred in the middle of the 16th meeting of the CBRNE Sensing Conference: part of the 2015 SPIE Defense, Security + Sensing Symposium. Despite the continued restrictions on travel and conference attendance, primarily from government participants, the CBRNE Conference was well attended and provided a unique forum where novel chemical and explosives sensing, bio-detection, and nuclear and radiological detection technologies and methods were presented over three days.

This year several themes emerged that define some of the most interesting presentations:

- Small, portable platforms: smartphone spectrometers
- Multi-functional materials and nanocomposites
- Complex, multi-pulse spectroscopy

Smartphones are proving a popular platform for hand-held spectroscopy. Smartphone cameras developed for producing high pixel-count images and operating under low-light conditions have proven sufficient for: fluorescence microscopy, colorimetric spectroscopy of colored liquids in enzyme linked immunosorbent assays, and aerosol particle counting. The use of a smartphone-based platform provides substantial usability benefits including advanced user-interface and data-processing algorithms, and services such as cloud storage, geographic information system-tagging, and remote expert analysis.

New rationally-designed materials to improve chemical detection were described, but they were not all equally promising. In one of the best presentations, Dr. Otto Muskens provided a very informative talk on the use of plasmonics for the enhancement of electromagnetic fields around metallic nanostructures and demonstrated surface-enhanced infrared spectroscopy using arrays of indium tin oxide plasmonic nanoantennas. The combination of label-free infrared spectroscopy with the versatility of doped metal oxides has the potential of opening up new applications in sensing and spectroscopy, for example, as multifunctional transparent electrodes, catalysts, or electrically or optically controllable plasmonic devices.

Similarly, several inherently complex, multi-pulse spectroscopic techniques were highlighted and show enormous potential for enhanced sensitivity and interference rejection. Multiplex Coherent Anti-Stokes Raman spectroscopy (MCARS) has been used to create a complete Raman spectrum of a material of interest in milliseconds. However, these MCARS spectra often embedded in a nonresonant background (NRB) that reduces the ability to use those spectra to

positively identify the material of interest. ARL presented several algorithms for NRB removal. However, a subsequent MCARS presentation by Dr. Paul Pellegrino indicated that MCARS is an inherently difficult technique and that is not quite ready for prime time analysis of unknowns.

Once again I want to thank my committee who really makes this conference happen. There is no way I could review all the abstracts and proceedings papers or host all the sessions without them. I am confident that this conference remains the most important means of bringing together the leaders in the field of CBRNE sensing from every sector; government, academia and industry. I am already excited about next year's conference and the new developments it will report on.

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