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Introduction

The past twenty years have seen a massive investment in photonics, electronics and MEMS, aimed at developing new telecommunications capabilities and innovative consumer products. These investments have led to advances in miniature optics, light sources, tunable filters, array detectors, fiber optic sensors, and a range of other photonic devices, across the whole electromagnetic spectrum, along with technologies for their mass production. In addition, there have been remarkable developments in handheld consumer electronics (cell phones, RF technology, processors, operating systems, displays, user interfaces, memory, Bluetooth, WiFi, cameras, accelerometers, GPS, etc.). All of these advances are increasingly being exploited in new spectroscopic instruments, and are now poised to be the basis of next generation handheld scientific instruments.

Portable and handheld instruments are being developed that are often more sensitive and selective, smaller, cheaper, and more robust than their laboratory predecessors. Concurrent improvements in analytical theory, data analysis methods and portable processors enable these spectroscopic devices to give specific, actionable, answers to their non-specialist operators. Spectroscopy-based systems are now making critical judgments in environments and applications that were unreachable twenty years ago, from hazardous materials to the operating theater, and from field geologists to customs and border personnel.

Advances in array detectors (CCD, CID, InGaAs, InSb, MCT, CMOS, etc.) are enabling a new generation of faster imaging spectrometers, with both laboratory and field applications. Lower-cost infrared arrays have been developed, employing MEMS techniques. Again, advances in laser sources, particularly the mid-infrared are for the first time being used in combination with advances in detector technology to create new spectroscopic platforms.

The emphasis in this conference is on advanced technologies for spectroscopic instrumentation, particularly the infrared, near-infrared, and Raman molecular techniques, but also including advances enabling miniature and portable spectrometers across the electromagnetic spectrum, including x-ray fluorescence, teraHertz, electron spin resonance, nuclear magnetic resonance and mass spectrometry.

This conference premiered at Optics East 2007 in Boston, MA and is now part of the Defense Sensing & Security Symposium. In 2012, the conference spanned two days, and was divided into sessions focusing on: Spectrometers in the Field; Enabling Technologies; Imaging and Chemometrics; Laser-Based and Cavity Ringdown Spectroscopy; Raman, SERS and Security Applications; and Novel

Spectrometers. In all 38 papers were presented, and we are pleased to be able to bring you 35 of them in these proceedings.

On behalf of our program committee members, we hope that we can count on your participation in a future Next-Generation Spectroscopic Technologies conference.

Mark A. Druy
Richard A. Crocombe