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Introduction

The past twenty-five years have seen a massive investment in photonics, electronics and MEMS, aimed at developing new telecommunications capabilities and innovative consumer products. This has 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. Similarly, in recent years, there have been remarkable developments in handheld consumer electronics, especially cell phones and portable audio/video players. Today's devices contain advances in RF technology, processors, operating systems, user interfaces, memory, Bluetooth, WiFi, GPS, cameras, accelerometers, etc. These technologies 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 more targeted at specific applications than their laboratory predecessors. They may have performance (measured as resolution, spectroscopic range, signal-to-noise, etc.) that is 'good enough' for field screening applications. However, they are often more selective, smaller, cheaper, and more robust.

Concurrent improvements in analytical theory, data analysis methods, algorithms and the power of 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. New laser sources, particularly in the mid-infrared, are 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, laser induced fluorescence, laser induced breakdown spectroscopy (LIBS), Terahertz, nuclear magnetic resonance and mass spectrometry. The conference also includes papers describing breakthrough and

novel, recently-introduced, commercial instrumentation. For instance, the past year has seen the first true-handheld commercial LIBS instruments, the first true-handheld commercial mass spectrometer and the first QCL-based infrared microscope spectrometer.

This conference premiered at Optics East 2007 in Boston, MA and is now part of the Sensing Technology and Applications Symposium. In 2014, the conference spanned two days, and was divided into sessions focusing on: Novel Spectrometer Technologies; Laser Spectroscopy and LIBS: Technologies and Applications; Novel or Portable Infrared and Raman Spectrometers and Innovations in Imaging Spectrometers. In all, 39 papers were presented, and we present 32 in this volume.

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