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# *Optical Sensing and Detection*

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*Editors*

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# Introduction

SPIE Photonics Europe proposes a conference track on optical sensing since the 2004 edition, followed by other well-received sessions during the 2006 and 2008 events (see SPIE Proceedings vols. 5459, 6189, and 7003). The 2010 edition, along with guided-wave and other optoelectronic sensors, also embraces infrared sensors, as well as CMOS-based and light detectors.

The papers applying optical technologies for sensing reflect the growing interest of diverse application sectors in using innovative optical-fiber, or micro-optic, or laser-based devices.

The optical fiber sensors, which continue to be experimented as individual sensors of physical (temperature, vibration, strain, displacement, etc.) or chemical ($O_2$, gases/vapors) parameters, and for medical diagnostics, also show new applications in effective photonic skins and foils. In addition to sensors making use of solid-core fibers, new hollow-core microstructured fibers are proposed, made of both silica and polymers. The fiber holes can be empty or suitably liquid-filled, thus providing enhanced sensitivity and selectivity to specific electrical parameters.

New micro-optic designs and new optical materials are proposed for gas sensing, with a particular attention to the achievement of low-cost devices. They show potentials of detecting a variety of gases by means of a single device, for both industrial and domestic applications. Micro-optics architectures are also presented for monitoring the composition of liquids, especially for providing an early warning of contamination onset.

Spectroscopy based sensors and refractometers are experimented for the most diverse applications, ranging from the classification of ancient glasses, to quality control of agri-food, to welding diagnostics, to VISA card verification, as well as in opto-fluidic devices and in befoul quality monitoring. LIBS and tunable diode laser spectroscopy are also presented for environmental and industrial applications. In addition to spectroscopy based sensors, also micro-optic components for spectroscopy are shown, such as micro-resonators for high-resolution spectral analysis and a micro-system for time-resolved fluorescence spectroscopy.

The good quality and creativity of papers presented reflects the enduring appeal of optical technologies for sensing. This research topic is expected to be further stimulated by the rapid evolution and continuous supply of innovative, versatile, and reliable optoelectronic components.

We are grateful to all of authors for their talks and written contributions, and to conference attendees for their active participation and stimulating questions. The support and patience of SPIE staff in the preparation of these Proceedings is also greatly acknowledged.

We are looking forward to meeting again a creative scientific community at next SPIE Photonics Europe event, which will be held for a second time in Brussels in 2012.

**Francis Berghmans**
**Anna Grazia Mignani**
**Chris A. van Hoof**