

Preface

Special Issue of Photonic Sensors for Chemical, Biological, and Physical Parameter Detection

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Photonic sensors have been developed for use in many laboratory and industrial environments for detection of a wide variety of physical, biological and chemical parameters. Both free space and guided wave optical sensors have been demonstrated for use in such diverse applications as food processing, electric power generation, jet engines, oil production, radiation detection, chemical and biological warfare agent detection, and health monitoring, just to name a few. In general, photonic sensors possess some attractive advantages such as immunity to electromagnetic interference, capability to access long-reach applications, and multiplexing capability for many of the sensor designs. Special photonic sensor designs can also possess small size, light weight, high resolution, and low cost implementation attributes. Photonic sensors can be of several different designs (to utilize different components of the optical signal) such as intensity based, interferometric, polarization, spectroscopic, pulse shape or arrival time based. Progress in photonic sensor designs and applications continues at a fast pace with new types of optical fibers - photonic band gap fibers (PBG), microstructure optical fibers (MOF), random hole optical fibers (RHOF); higher resolution, lower cost, and or expanded detection range capability for sources and detection schemes; and new signal demodulation algorithm designs.

With this rapidly advancing field, this special issue focuses on photonic sensors for chemical, biological and physical parameter detection. Seven papers make up this special issue with papers focused on optical microsphere resonator biosensor detection of thrombin for surgical and cardiovascular disease therapy applications; an optical polarimetry based single crystal sapphire sensor for ultra high temperature measurements (up to 2000°C); a fiber optic biosensor for *Listeria* detection; a very low cost optical pH sensor; a nanoporous, zeolite-based, interferometric fiber optic sensor for dissolved species detection; a fiber optic biosensor for *E-coli* detection in the food processing industry; and a surface plasmon resonance sensor for toxic nerve agent detection. I hope that this special issue will give the reader a broad overview of some of the exciting areas of photonic sensor research with this selection of innovative research articles.

** About the Guest Editor*

Dr. Pickrell is the Associate Director of the Center for Photonics Technology in the Electrical and Computer Engineering Department at Virginia Tech, one of the largest fiber optic sensor groups in the world, primarily dedicated to harsh environment sensor development. He is also an Assistant Professor in the Materials Science and Engineering Department, and the Director of the Nano-Biomaterials Research Laboratory. He is a 2004 winner of the R&D 100 award for one of the top products developed worldwide (a fiber optic sensor suite for down-hole oil recovery enhancement); winner of the Outstanding Assistant Professor award; has served on numerous program organizing committees such as Optics East Sensor for Harsh Environments (2004, 2005 and 2006), Fiber Optic Sensor Technology and Applications (2005 and 2006), IEEE Sensor Conference (2005 and 2006), and the 8th symposium on Temperature Measurement and Application; he has chaired many sessions at international conferences on sensors; has over 100 publications and 10 patents issued; and has been an invited participant and speaker at many conferences and at NSF, USGS, and DOE workshops.

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