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Fiber Optic Sensors and Applications VII

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Introduction

SPIE has been sponsoring conferences on fiber optic sensor technology for over 30 years, and the Fiber Optic Sensors and Applications VII conference continues this tradition. This conference combines the former Fiber Optic Sensors and Applications, Sensors for Harsh Environments, and Photonic Crystals and Photonic Crystal Fibers for Sensing conferences into a single major fiber optic sensor conference that covers all aspects of fiber optic sensor technology, for both civil and defense applications.

Major R&D efforts in fiber optic sensor technology have been conducted since the mid 1970s, which have led to the development, among many others, of optic acoustic sensors based on the Mach-Zehnder interferometer; fiber rotation gyro (FOG) sensors based on the Sagnac interferometer; discrete point sensors based on Fabry-Perot and fiber Bragg gratings; as well as distributed sensing techniques based on Rayleigh, Raman and Brillouin scattering techniques. Today, fiber optic sensors enjoy widespread use in a broad variety of applications and fields ranging from structural sensing and health monitoring of composites and structures in civil and aeronautic areas; to downhole pressure and temperature sensors for oil and gas reservoir monitoring; to high voltage and high current sensing systems for the power industry—to name just a few. However, new components and technology are continually being developed to support enhancement and extensions of existing fiber optic sensor technology, as well as to allow totally new innovations. New innovations—such as photonic crystals—which offer the prospect of new highly efficient light sources as well as the potential for much higher levels of performance.

Given the unique optical properties of Photonic Crystal Fibers (PCF) coupled with the development of new and improved fabrication techniques and availability of high-quality photonic bandgap crystals, has fueled the global interest in their theoretical and experimental studies. The optical properties such as bandgap and light propagation characteristics of photonic bandgap crystals and PCFs can be manipulated by structural design and defect engineering. These properties can also be altered by external stimuli that can be thermal, optical, electrical, magnetic, chemical, biological, and nuclear, etc. The great potential of photonic bandgap crystals and PCF has been well-recognized for a variety of applications.

The overall result has been a continuing revitalization of the fiber optic sensor field that is apparent in the papers that are contained in these proceedings.

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