Encoded Fiber Optic Sensors for Simultaneous Multipoint Sensing

Authors : C. Babu Rao, Pandian Chelliah

Abstract : Owing to their reliability, a number of fluorescent spectra based fiber optic sensors have been developed for detection and identification of hazardous chemicals such as explosives, narcotics etc. In High security regions, such as airports, it is important to monitor simultaneously multiple locations. This calls for deployment of a portable sensor at each location. However, the selectivity and sensitivity of these techniques depends on the spectral resolution of the spectral analyzer. The better the resolution the larger the repertoire of chemicals that can be detected. A portable unit will have limitations in meeting these requirements. Optical fibers can be employed for collecting and transmitting spectral signal from the portable sensor head to a sensitive central spectral analyzer (CSA). For multipoint sensing, optical multiplexing of multiple sensor heads with CSA has to be adopted. However with multiplexing, when one sensor head is connected to CSA, the rest may remain unconnected for the turn-around period. The larger the number of sensor heads the larger this turn-around time will be. To circumvent this imitation, we propose in this paper, an optical encoding methodology to use multiple portable sensor heads connected to a single CSA. Each portable sensor head is assigned an unique address. Spectra of every chemical detected through this sensor head, are encoded by its unique address and can be identified at the CSA end. The methodology proposed is demonstrated through a simulation using Matlab SIMULINK.

Keywords : optical encoding, fluorescence, multipoint sensing

Conference Title : ICOFS 2015 : International Conference on Optical Fiber Sensors

Conference Location : Singapore, Singapore

Conference Dates : January 08-09, 2015