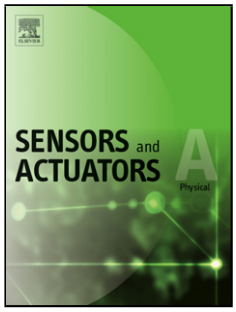

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Multi-point gamma-ray monitoring at radioprotection levels with image devices

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RESEARCH HIGHLIGHTS

- Simultaneous interrogation of several extrinsic polymer optical fiber sensors applied to gamma ray monitoring
- Use of low demanding image devices as interrogation unit: no TEC coolers, nor optical filters, nor image intensifiers
- Use of digital image processing techniques for intensity measurements at specific regions of interest (ROIs) and for specific RGB color channel
- Scalable system: sensors response is spatially coded into a 2D image. Selection of limit of detection through exposure time
- Detection of radionuclides presence and drift over time with sensing heads deployed over wide areas

ABSTRACT

A multi-point system for the simultaneous interrogation of several extrinsic polymer optical fiber-based gamma-ray sensors is demonstrated. As a proof of concept, four different sensing heads have been measured, all of them based on a chemically etched fiber tip plus an inorganic scintillator powder. Two inorganic scintillators have been tested, namely Terbium doped Gadolinium Oxysulfide (Tb:GADOX) and Cerium doped Yttrium-Aluminum garnet (YAG:Ce). These sensing heads are interrogated with a commercial image device (CMOS camera). Such device does not need any cooling stage, optical filters or image intensifier elements. The response for each individual transducer is inside a 2D grid-shape array image, which provides a multiplexing method scalable with the number of the desired interrogation points. The interrogation procedure takes advantage of well-stablished digital image processing techniques, which include the selection of the regions of interest (ROIs) associated to the response of each individual sensing-head, plus the suitable RGB channel selection to improve