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Editorial Open Access

Optical Fibre Dosimetry

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Editorial

For past few years, the optical fiber dosimetry has been started to significantly grow in different ionizing radiation applications due to their natural advantages in the sense of dosimeter characteristics and capability are used as both real-time and off-line monitoring.

Characteristics of fiber optics under the various dosimeter aspects instant different radiation and wide ranges of doses have been reported in many case-studies. However, generally, optical fibers which is available commercially in the market have been used, which provided lots of ambiguous on the subject of dosimeter characteristics regarding to various fabrication process, materials doped and element concentrations used by different manufacturers [1,2].

Optical fibers have been demonstrated as a potential contestant for radiation dose sensor due to its high resolution, acceptable sensitivity, and linear response over wide range of dose in compare with the commercial dosimeter sensors. A high sensitive dosimeter in radiation therapy could be very helpful, for measuring accurate dose delivered to the tumor which results in a better treatment by higher controlling the tumors and lower post radiation therapy complications [3]. Many different types of materials and elements have been doped in silica fiber optics and glasses to develop the radiation dose sensitivity. Among them germanium, lithium and barium, aluminium, manganese calcium tetra-borate doped (CaB_4O_7:Mn) nanocrystal, zirconium oxide, titanium oxide doped in lithium potassium borate glass and magnesium oxide could be named. In such studies, besides looking for a high sensitive material and/or optimum concentration for radiation dose detection; new methods that can gain sensitivity of an optical fiber were discussed [4,5].

In the past two decades, the fibre dosimetry has grown to become a reliable substitution for radiation detection in different range of dose and environmental conditions. The importance of this measurement is due to the potential harmful nature of ionizing radiation, and some historical finding. Ionizing radiation have various natural (i.e., cosmic radiation, radioactive elements and etc.) and artificial sources (nuclear plants, radiotherapy sources and etc.) in the earth that not always harmful. The utilize of film dosimeters has been diminished since 1985 and it was largely due to replacement of those films by thermoluminescence dosimeters (TLDs). *In vivo* and *in vitro* TLD dosimetry has also turn out to be widespread, the dosimeters, as illustrated by the therapeutic level work of many scientists, have been used to monitor the electron and photon radiation [3,6]. Another instance of TLDs used at *in vivo* studies as the main dosimetry system that can be added to this, is a typical dose range of oncology treatment about 0.1-10 Gy for total body radiation experiments. When sensitive parts of body (i.e., gland, neck, eye and head) have been targeted for radiation, the cumulative spatial resolution of the TLD has become a great deal important [3,7].

Silica based fiber optics have been shown to be an interesting potential nominate for such radiation dosimeters, with principally linear response over wide range of doses, exceptional spatial resolution, energy and temperature independence and suitable sensitivity, the latter at a range that has now become comparable with that of available commercial radiation detectors [2]. Furthermore, optical fibers are immune to electromagnetic interference, impervious to water (suitable for *in vivo* application), and capable to be used in real time or offline monitoring systems with significantly lower cost compared to the commercially available dosimeters.

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