

Investigation of Polymer Composite for High Dose Dosimetry

Authors : Esther Lorryne M. Pereira, Adriana S. M. Batista, Fabíola A. S. Ribeiro, Adelina P. Santos, Luiz O. Faria

Abstract : In this work we have prepared nanocomposites made by mixing Poli (vinilidene fluoride) (PVDF), zirconium oxide (ZrO_2) and multi-walled carbon nanotubes (MWCNTs) aiming to find dosimetric properties for applications in high dose dosimetry. The samples were irradiated with a Co-60 source at constant dose rate (16.7 kGy/h), with doses ranging from 100 to 2750 kGy. The UV-Vis and FTIR spectrophotometry have been used to monitor the appearing of C=C conjugated bonds and radio-oxidation of carbon (C=O). FTIR spectrometry has that the absorbance intensities at 1715 cm^{-1} and 1730 cm^{-1} can be used for high dosimetry purposes for gamma doses ranging from 500 to 2750 kGy. In this range, it is possible to observe a linear relationship between Abs & Dose. Fading of signal was evaluated for one month and reproducibility in 2000 kGy dose. Scanning Electron Microscopy (SEM) and Energy-dispersive X-ray spectroscopy (EDX) was used for evaluated the dispersion ZrO_2 and MWCNT in the matrix of the PVDF.

Keywords : polymer, composite, high dose dosimetry, PVDF/ ZrO_2 /MWCNT

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