

Normoxic Polymer Gel of Hydroxy-ethyl-acrylate (HEA) as Radiation Therapy Dosimeter

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Abstract

An absorbed X-radiation dose in the range of radiotherapy for cancer patients (0-12 Gy) has been measured and characterized in a polymer/Gel dosimeter (Polym/Gel) which composed of normoxic hydroxyl-ethyl-acrylate/Gel (HEA/Gel). The characterization of the irradiated HEA/Gel by Nuclear Magnetic Resonance (NMR) showed that the relaxation rate $R_2(t)$ for proton has been increased following the radiation dose indicating the polymerization of HEA/Gel monomer to poly(hydroxyl-ethyl-acrylate/Gel) PHEA/Gel. The PHEA/Gel has been characterized by Raman spectroscopy which confirms the polymerization of HEA/Gel with reference to the new chemical bond formation at Raman shift of 1415 cm^{-1} which in turn was being increased following the radiation dose. Then the color change of PHEA/Gel due to radiation polymerization has been studied by optical density-meter out of MRI image which showed that the optical density increases along the axis of the radiation field in depth profile for a limited distance then decreases by increasing the radiation.

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