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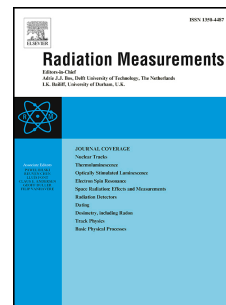
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Radiation-induced coloration of nitro blue tetrazolium gel dosimeter for low dose applications

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Abstract

A radiochromic sensor of nitro blue tetrazolium (NBT) in gelatin was evaluated as a new gel dosimeter for radiation applications. The NBT gel has the advantage of visual color change from faint yellow to violet at low absorbed doses (10-1000 Gy). This color change appears as a result of the reduction of NBT to colored formazan then to diformazan species with further increase of absorbed doses. Responses of the gel at different NBT concentrations were analyzed at the absorption maximum centered at 527 nm. An increase of NBT concentrations in the gel enhances the radiation dose sensitivity. Energy dependent study implies the tissue equivalency of the gel in the energy range of 0.15–20 MeV. Dependence of the gel response on irradiation temperature, and color stability before and after irradiation were also studied. The combined uncertainty associated with the dose monitoring (10-1000 Gy) is 6.26% (2σ). Thus, the NBT gel shows its suitability for food irradiation, insect population control, and some food irradiation applications.

KeyWords: Nitro blue tetrazolium; Gel dosimetry; Gamma radiation; Spectrophotometry

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