The Sensitivity Analysis of Tooth Enamel to The Absorbed Dose for The Application to EPR Dosimetry

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ABSTRACT

Electron Paramagnetic Resonance (EPR) spectroscopy is one of the methods applicable to retrospective dosimetry. The retrospective dosimetry is a process that is a part of dose reconstruction for estimation of exposed dose occurred years before the estimation. Many techniques can be used to the retrospective dosimetry. As a physical method, EPR analysis of biological material measures the quantity of free radicals generated in the material from the interaction of radiation and material. Since the later 80s, in many countries, EPR dosimetry with tooth enamel has been studied and applied for the retrospective dosimetry. In the consideration of the biological materials for EPR dosimetry, human fingernail, hair, bone and tooth are generally considered. The tooth can be separated as enamel, dentine and cementum. Among the three parts, enamel shows the best sensitivity to the absorbed dose and is most widely used. In this study, the characteristics of tooth enamel for EPR dosimetry is examined and experimented. At the experiment, for easy separation, tooth was cut into 4 parts and then each part is treated by ultrasonic vibration in NaOH liquid to reduce mechanically induced noise in the corresponding signal. After the separation of the enamel from dentine, background EPR signal is measured and then radiation-induced EPR spectrum is estimated.