Study of Optically Stimulated Luminescence of LiF:Mg,Ti for beta and gamma radiation

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In vivo dosimetry is desired for cancer patients to ensure that the patient is not overexposed or that the exposure occurred in the desired region [1]. *In vivo* dosimetry has traditionally been provided by thermoluminescent dosimeters (TLDs), PN-junction-type diodes, or metal organic semiconductor field effect transistor (MOSFET) detectors [1, 2, 3]. The use of synthetic materials for optically stimulated luminescence (OSL) has greatly improved the sensitivity of the method; it has now been used for about 10 years as a method for monitoring occupational radiation dose. The OSL material has now been fabricated into a dosimeter that can be used for *in vivo* dosimetry of radiation therapy patients [1, 4].

This work aims to study the application of OSL technique using dosimeters of lithium fluoride doped with magnesium and titanium (LiF:Mg,Ti) dosimeters produced by *Harshaw Chemical Company* for application in beta and gamma dosimetry. The dosimeters were previously selected according to their thermoluminescent responses for ^{60}Co gamma radiation with sensitivities better than ± 5%. The dose-response curves for doses ranging from 0.5 to 15 Gy and the reproducibility and intrinsic efficiency of the OSL response of the dosimeters for beta and gamma radiation were evaluated using a OSL reader RisØ TL/OSL DA-20. The beta radiation source consists of an ^{90}Sr-^{90}Y source (positioned inside the OSL reader) and the gamma radiation source consists of ^{60}Co souce from Laboratory of Dosimetric Materials/LMD-IPEN. The lower detection limit was calculated for the LiF:Mg,Ti dosimeters to both types of radiation. The obtained results indicates that the LiF:Mg,Ti dosimeters can be used for beta and gamma radiation detection using OSL technique in the studied dose range.

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