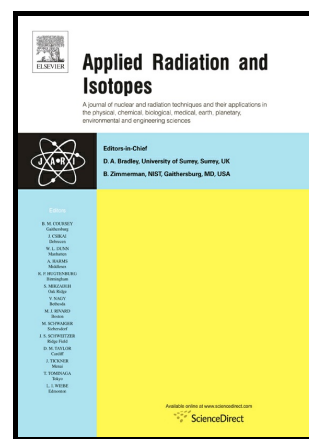


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OSL properties of $\text{KMgF}_3\text{:Tm}^{3+}$ for dosimetric applications as OSL dosimeter

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Abstract

The optically stimulated luminescence (OSL) properties of undoped and Tm^{3+} -doped KMgF_3 fluoroperovskite have been investigated for the first time. KMgF_3 compounds were synthesized by solid state reaction method and two different procedures were employed to improve the contact among the reagents, namely, the compressed powder was put either in an alumina crucible or in a platinum foil. The maximum OSL emission was found in samples prepared in an alumina crucible and doped with 0.5 % mol of thulium. The radioluminescence (RL) spectrum shows two emission peaks at 455 and 360 nm, which can be ascribed to the $^1\text{D}_2\text{--}^3\text{F}_4$ and $^1\text{D}_2\text{--}^3\text{H}_6$ transitions of Tm^{3+} cations. The OSL dosimetric properties of the most promising composition, namely, $\text{KMgF}_3\text{:Tm}^{3+}$ (0.5 % mol), have also been determined and analyzed. This compound exhibits good linearity in the dose range from 0.1 up to 100 Gy and satisfactory repeatability with a percentage standard deviation of 2.4 %. Therefore, an OSL fading of approximately 75 % in the first 36 hours of storage is observed and then, the response remains almost constant. These characteristics, together with a minimum detectable dose of 0.04 Gy and the rapid erasing of the OSL signal after 100 s of stimulation, which makes feasible to bleach completely the residual OSL in order to restore the sample between dose measurements, suggest the potential of this perovskite as OSL dosimeter.

Keywords: *Optically Stimulated Luminescence; Fluoroperovskite; Dosimetry.*

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