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# Rare Earth Doped Alkali Halide Crystals for Thermoluminescence Dosimetry Application

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**Abstract :** The Europium (Eu) doped (0.02-0.1 wt %) lithium fluoride (LiF) crystal in the form of multicrystalline sheet was gown by the edge defined film fed growth (EFG) technique. Crystals were grown in argon gas atmosphere using graphite crucible and stainless steel die. The systematic incorporation of Eu inside the host LiF lattice was confirmed by X-ray diffractometry. Thermoluminescence (TL) glow curve was recorded on annealed (AN) crystals after irradiation with a gamma dose of 15 Gy. The effect of different concentration of Eu in enhancing the thermoluminescence (TL) intensity of LiF was studied. The normalized peak height of the Eu-doped LiF crystal was nearly 12 times that of the LiF crystals. The optimized concentration of Eu in LiF was found to be 0.05wt% at which maximum TL intensity was observed with main TL peak positioned at 185 °C. At higher concentration TL intensity decreases due to the formation of precipitates in the form of clusters or aggregates. The nature of the energy traps in Eu doped LiF was analysed through glow curve deconvolution. The trap depth was found to be in the range of 0.2 – 0.5 eV. These results showed that doping with Eu enhances the TL intensity by creating more defect sites for capturing of electron and holes during irradiation which might be useful for dosimetry application.

**Keywords :** thermoluminescence, defects, gamma radiation, crystals
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