

Optically stimulated luminescence of the $20\text{Li}_2\text{O} - (\text{X})\text{K}_2\text{O} - (80 - \text{X})\text{B}_2\text{O}_3$ glass system

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The main goal of this work was to analyze the optically stimulated luminescence (OSL) signal for a borate glass containing lithium and potassium oxides as glass modifiers. This type of glass presents desirable characteristics for dosimetry and has been intensively analyzed for TL [1]. Five glass formulations were produced [$20\text{Li}_2\text{O} - \text{XK}_2\text{O} - (80-\text{X})\text{B}_2\text{O}_3$; $\text{X}=10, 15, 20, 25,$ and 30 mol%] and analyzed regarding their OSL signal when exposed to a beta emitter source.

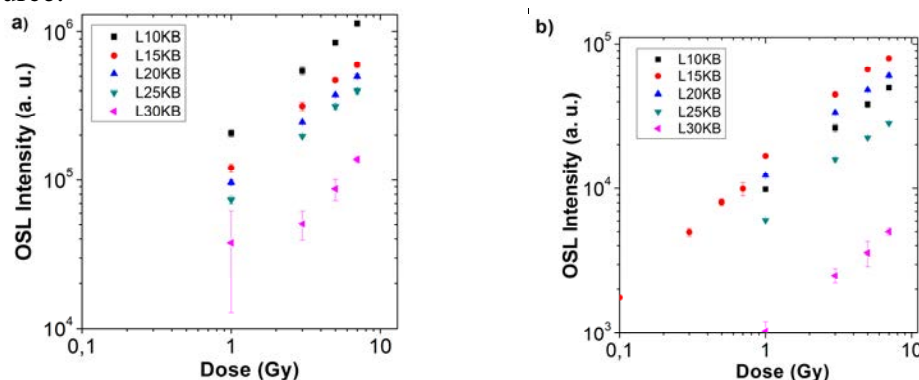


Fig. 1. Dose-response curves considering the area of the OSL signal for a) 40 s, b) 0,16 s of stimulation.

If the total area below the curve was considered (Fig.1a), the composition named as L10KB presented the most intense signal. However, if the initial OSL intensity was chosen (Fig.1b), L15KB was the most sensitive. A comparison of the OSL decay for the two quoted compositions, after the application of a pre-heating process of $200\text{ }^\circ\text{C}/10\text{ s}$, showed a slightly change in the decay pattern comparing to the case without pre-heating. Pre-heating treatments also showed the relation between the shallow traps and the fast component of the OSL decay for L15KB, which was already noted for phosphate glasses [2]. For all compositions, an increase in the dose implied in an increase of the emitted signal, and no signal of saturation was verified for the tested dose range (0.1 Gy to 7 Gy).

Keywords: Dosimetry, glasses, OSL.

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References

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