

## OPTICALLY STIMULATED LUMINESCENCE STUDY OF LITHIUM TETRABORATE DOPED WITH $\text{Cu}^+$ AND $\text{Ag}^+$ SYNTHESIZED BY SOLUTION COMBUSTION

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**Introduction:** Doped lithium tetra borate (LTB) are well-known polyfunctional materials widely used as X-ray phosphors, scintillators and thermoluminescent (TL) detectors. Its effective atomic number  $Z_{\text{eff}}$  (7.25) is very close to the human tissue, important characteristic for application in medical dosimetry. There are many publications about the TL response of this material [1,2] and few studies about its optically stimulated luminescence (OSL) response. The aim of this work is to investigate the OSL response of  $\text{Li}_2\text{B}_4\text{O}_7$  co-doped with Ag and Cu, produced by combustion synthesis [3].

**Material and method:** The samples of  $\text{Li}_2\text{B}_4\text{O}_7$ : Ag,Cu were produced via Solution Combustion Synthesis (SCS) method by mixing stoichiometric amounts of  $\text{LiNO}_3$ ,  $\text{H}_3\text{BO}_3$ , urea ( $\text{CO}(\text{NH}_2)_2$  - as fuel) and 0,4% mol of  $\text{CuCl}$  0,1% mol of  $\text{AgNO}_3$  (as dopants). The mixture was placed in a beaker and heated in a hot plate for a few minutes and then transferred to a muffle furnace at 450 °C, where spontaneously ignited after one to two minutes. The powder produced was heated at 850 °C for 1 hour. After that, the resulting powder was sieved and cold pressed in pellets with 6mm diameter and 1mm thickness. The OSL signal was measured on an automated Lexsyg Smart OSL/TL reader with an internal  $^{90}\text{Sr}/^{90}\text{Y}$  source. The OSL response was evaluated using Blue and Infrared continuous mode stimulation during 120s. For the BSL measurements it was used LEDs with peak emission at 458 nm and a power of 50  $\text{mW}/\text{cm}^2$  with a 380 nm filter pack. For IRSL it was used LEDs with emission peak at 850 nm, a Wide-Band-Blue filter pack and power set to 250  $\text{mW}/\text{cm}^2$ .

**Results:** Figure 1 shows the BSL response of the samples and the calibration curve for beta irradiation with doses in the range of 0.085 - 3.4 Gy. The results show a linear response of the BSL signal with the radiation dose. It was not observed an IRSL signal, indicating that the  $\text{Li}_2\text{B}_4\text{O}_7$ : Ag,Cu is sensitive only for blue stimulation, in the range of doses studied.

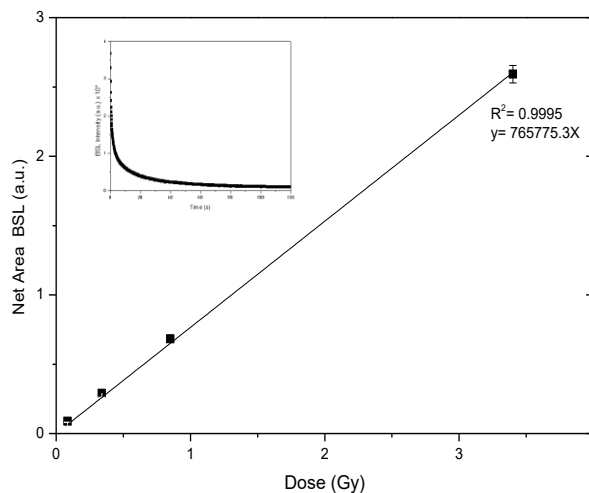


Figure 1: BSL response and its calibration curve for beta radiation with doses above 3.4 Gy.

**Conclusions:** Lithium tetraborate co doped with Ag and Cu produced by solution combustion technique has a highly sensitive BSL response and very low IRSL response in the range of the doses studied. In future studies it will be evaluated the emission spectra and the energetic dependence response of this material.

### References:

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