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Dysprosium-Doped Lithium Borate Glass for Dosimetry Applications

Thursday, November 14, 2024 1:00 PM (1h 30m)

Lithium borate glass and Dysprosium (Dy^{3+}) ions are well-suited for radiation dosimetry due to their atomic numbers, which closely resemble that of human tissue, and the superior light emission properties of Dy^{3+} ions. Lithium borate glass with a composition (mol%) of (50-X)li2CO3: 50B203: XDy2O3 where X is 0.1%, 0.5% and 1% were prepared by conventional melt quenched technique. Properties analyzed include structural, physical, X ray luminescence, optical, photoluminescence (PL), and thermoluminescence (TL). The XRD spectra display broad humps without any sharp crystallization peaks, indicating that the glass samples are amorphous in nature. X ray luminescence shows a strong peak at 575nm because of 4F9/2 ⟶ 6H13/2 transition and the second most intense peak at 484nm is due to 4F9/2 ⟶ 6H15/2 transition. PL excitation spectra show seven sharp peaks due to 4f - 4f transition of Dy^{3+} ions and emission spectra exhibit two strong bands centered at 484 nm (blue) and 575 nm (yellow). The PL intensity for both the blue and yellow peaks of these glasses is increased under 248 nm laser excitation. The transmittance spectra were also analyzed to better understand the absorption characteristics of these glasses. Our findings emphasize the distinctive properties of Dysprosium-doped lithium borate glasses, making them valuable for various applications, particularly in radiation physics and dosimetry. This research enhances the understanding of the behavior of Dysprosium-doped lithium borate glass under various excitation sources, emphasizing its potential applications in fields like radiation physics and dosimetry.

Paper submission Plan

No

Best Presentation

Yes

Contribution track

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Primary author: Ms FELIX, Anastazia Tarimo (KNU)

Co-authors: Mr TON, Nguyen Duc (KNU); Prof. KIM, HongJoo (KNU)

Presenter: Ms FELIX, Anastazia Tarimo (KNU)

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