Luminescent properties of Pr^{3+} doped $LiBaF_3$ crystallites

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Over the past decades, considerable progress has been made in the research of luminescent materials. This progress encompasses the discovery of new phosphors as well as deeper investigations into existing ones. Additionally, significant advances in characterization methods have led to a refined understanding of luminescence mechanisms. Numerous new luminescent materials have been created that emit across the spectrum from ultraviolet to infrared. Praseodymium is a unique activator that, depending on the matrix, can emit throughout this range due to the interaction between its abundant 4f energy levels and the 4f5d state. Particularly intriguing is that the optical properties of materials activated by Pr^{3+} in the UV range can be modulated by altering the crystallographic environment of the activator ion. Among the variety of matrices, fluoride matrices are most often studied due to their low phonon energy, high optical transparency, good chemical and photochemical stability.

In this study, crystallites $LiBaF_3$ with different concentration of Pr^{3+} were obtained by the solid state method. The structure, luminescence properties in UV-vis range and X-ray excited luminescence are investigated. Particular attention was paid to providing information on the possible use of $LiBaF_3$:Pr^{3+} as a scintilators and optical-thermometer.

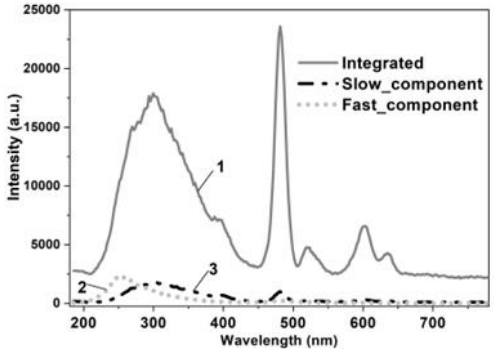

Fig. Time-resolved X-ray excited luminescence spectra of $LiBaF_3$:Pr^{3+} at 295 K: (1) integrated spectrum, (2) fast component, (3) slow component.

Acknowledgments: This work was supported by The National Science Centre (NCN) under the Miniatura 7 project, grant no. 2023/07/X/ST5/00965, which is gratefully acknowledged. A. Grippa (Oleksandr Gryppa) is supported by Visegrad Fellowship #62410067.

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