

SYNTHESIS AND LUMINESCENT PROPERTIES OF Eu^{2+} AND Ce^{3+} ACTIVATED $\text{Li}_2\text{SrSiO}_4$

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Some alkaline-earth silicates, activated with Eu^{2+} and Ce^{3+} ions, are of significant interest as perspective materials for manufacturing white light emitting diodes [1,2]. In this work, $\text{Li}_2\text{SrSiO}_4$ doped with Eu^{2+} and Ce^{3+} phosphors were prepared by solid state reaction and sol-gel method. The luminescence spectrum of Eu^{2+} ions in $\text{Li}_2\text{SrSiO}_4$ consists of a broad band in the range 500-700 nm with a maximum at 577 nm (see fig. 1). The excitation spectrum of this emission contains two broad bands in the range 300-500 nm with maxima at 310 and 394 nm. It should be noted, that the excitation spectrum shows a strong overlapping with the emission spectrum of a GaN-based diode ($\lambda_{\text{em}}=375$ nm).

Although the introduction of Ce^{3+} ions in $\text{Li}_2\text{SrSiO}_4$ requires charge compensation, no changes in the excitation and emission spectra of Ce^{3+} ion with the increase of the Ce^{3+} concentration were observed. Most probably, this is a consequence of the structural isolation of Sr^{2+} ions from each other by a three-dimensional network of $[\text{LiO}_4]$ and $[\text{SiO}_4]$ polyhedra.

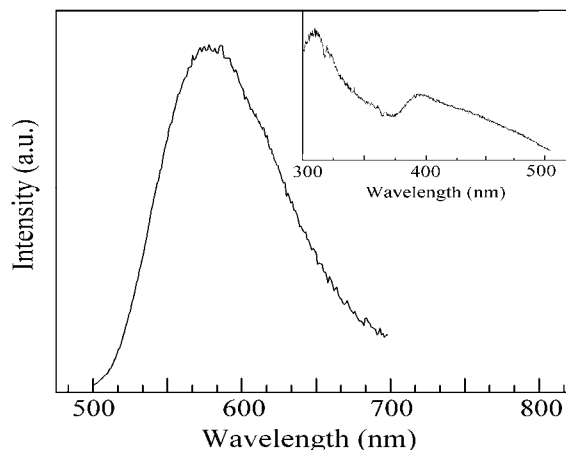


Fig. 1. Emission and excitation spectra of Eu^{2+} ions in $\text{Li}_2\text{SrSiO}_4$

Based on the results of luminescent experiments, we discuss the following aspects:

- influence of the preparation method on the luminescent properties of Eu^{2+} and Ce^{3+} in $\text{Li}_2\text{SrSiO}_4$;
- microstructure of Eu^{2+} and Ce^{3+} -related centers;
- mechanism for charge compensation of Ce^{3+} ions.

References

- [1] Jang H.S., Jeon D.Y. Appl. Phys. Lett. 90 (2007) 041906/1-3.
[2] Zhang X., He H., Li Z., Yu T., Zou Z. J. Lumin. 128 (2008) 1876.