

# Structural and spectroscopic insights into Sodium-Europium(III) orthophosphate

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Recently, increasing attention has been tuned to luminescence behaviour related to structure specialty of phosphor materials because microstructure of host material decides the fluorescence properties [1]. Phosphate is a good type of candidate for its reasonably large band gap, high thermal and chemical stability. The basic building block of phosphates is the PO<sub>4</sub> tetrahedron and EuO<sub>x</sub>, which is flexible and can inhabit various coordination environments by altering the Eu-O bond lengths in the wide range of 2.55–3.13 Å [2]. Moreover, combining EuO<sub>x</sub> octahedra with PO<sub>4</sub> tetrahedra may construct various structures in which these polyhedra are interconnected via common O atoms.

Although the spectroscopy of K<sub>3</sub>Eu(PO<sub>4</sub>)<sub>2</sub> has been currently well studied, replacing the cation with sodium can have a positive effect on the properties of the obtained Na<sub>3</sub>Eu(PO<sub>4</sub>)<sub>2</sub>. Based on single crystal data, the structure consists of PO<sub>4</sub> tetrahedra and isolated europium polyhedra, which together form the structural type of glaserite.

The synthesis of Na<sub>3</sub>Eu(PO<sub>4</sub>)<sub>2</sub> has been carried out by single crystal growth technique and by the solid-state method. The peculiarities of Na<sub>3</sub>Eu(PO<sub>4</sub>)<sub>2</sub> as a perspective phosphor has been discussed taking into consideration IR, luminescence spectroscopy and X-ray single crystal diffraction analysis.

1. Qin, D., & Tang, W. (2017). Crystal structure, tunable luminescence and energy transfer properties of Na<sub>3</sub>La(PO<sub>4</sub>)<sub>2</sub>: Tb<sup>3+</sup>, Eu<sup>3+</sup> phosphors. *RSC Advances*, 7(5), 2494-2502.
2. Ju, G., Hu, Y., Chen, L., Wang, X., Mu, Z., Wu, H., & Kang, F. (2012). A reddish orange-emitting stoichiometric phosphor K<sub>3</sub>Eu(PO<sub>4</sub>)<sub>2</sub> for white light-emitting diodes. *Optics & Laser Technology*, 44(1), 39-42.

## Type of presence

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