

## Synthesis and luminescence properties of K<sub>3</sub>Gd(PO<sub>4</sub>)<sub>2</sub>:Eu phosphor

*Saturday, 26 September 2020 15:14 (4 minutes)*

Design of new compounds for application in optoelectronic devices is one of the most actively developing branches of material science. In particular, various simple and complex oxides actively studied as materials for display panels and white light emitting diodes (WLED). Phosphate compounds doped with rare-earth (RE) ions were found to be one of the most promising for WLED applications due to good stability on action of high light fluxes, temperature, humidity, etc. The RE ions can greatly improve optical characteristics of oxides but concentration quenching of photoluminescence (PL) usually occurs starting from some content of RE dopants in host materials. Thus, increasing of luminescence intensity cannot be achieved only by increasing of RE content. This problem can be partially solved through co-doping of host with two types of ions, one of them acting like sensitizer for another.

In this work the Gd<sup>3+</sup> ions are considered to be sensitizers for highly luminescent Eu<sup>3+</sup> ions in K<sub>3</sub>Gd(PO<sub>4</sub>)<sub>2</sub> host. The series of the K<sub>3</sub>Gd<sub>1-x</sub>Eu<sub>x</sub>(PO<sub>4</sub>)<sub>2</sub> samples (where x= 0.01, 0.03, 0.07 and 0.10) were synthesized by growth from melt and by solid state techniques. The samples were characterized by means of powder X-ray diffraction, IR and luminescence spectroscopy.

The samples retain crystal structure of K<sub>3</sub>Gd(PO<sub>4</sub>)<sub>2</sub> within range of the Eu<sup>3+</sup> concentrations studied. Orange-red luminescence of the samples related with emission transitions in Eu<sup>3+</sup> ions only. Energy transfer from Gd<sup>3+</sup> ions to Eu<sup>3+</sup> ions was found from PL excitation spectra. The studied samples are perspective red phosphors for LED applications.

### Topics

Session A. Physics of condensed matter and spectroscopy

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**Session Classification:** Poster session