

Brief information about the project

Name of the project	AP26104965 Synthesis and luminescence of CaBPO5 :Eu: the role of isomorphous substitutions
Relevance	Borophosphates, in particular CaBPO5, are promising materials for luminescent devices due to their optical properties and the possibility of doping with rare earth elements (REE). Traditionally, the improvement of the phosphor properties is achieved by varying the composition of the cation sublattice, including the selection of the optimal activator concentration. However, the study of the effect of partial modification of the anion sublattice on luminescent properties is only beginning to actively develop. CaBPO5 is a convenient model for research in this direction. On the one hand, it has a simple composition, which simplifies the analysis of the effect of substitutions. On the other hand, the presence of two types of anionic groups (PO4)³⁻ and (BO4)³⁻ opens up wide opportunities for implementing various variants of anionic substitutions and studying their effect on luminescent properties. Thus, the study of isomorphous substitutions in the cationic and anionic sublattices of CaBPO5 is an urgent task, opening new ways for the development and optimization of highly efficient phosphors. Within the framework of this project, it is planned to optimize cationic substitutions with a systematic study of the effect of the ratio of europium and compensating ions (Li, Na, K) on the luminescence intensity and spectral characteristics in order to determine the optimal composition for maximum luminescence efficiency. It is also planned to study the effect of Ca²⁺ substitution for silver, copper and rubidium ions, which may lead to the discovery of new materials with unique properties. An important step will be the study of anionic substitutions, such as (PO4)³⁻ and (BO4)³⁻ for other anionic groups, in order to understand their effect on stability and luminescence characteristics. In addition, it is planned to combine cationic and anionic substitutions for a more fine-tuned luminescence characteristics of the materials. Finally, optimization of synthesis conditions, such as temperature and annealing time, will be carried out to achieve maximum luminescence efficiency for each new composition
Purpose	Study of the influence of isomorphous substitutions in the cationic and anionic sublattices of CaBPO5 on its luminescent properties in order to improve the efficiency and control the color of the emission.

Objectives	1. Obtaining new materials based on CaBPO5:Eu with increased luminescence efficiency and controlled emission color. 2. Identifying patterns of influence of various isomorphic substitution schemes on the luminescent properties of CaBPO5:Eu. 3. Creating a basis for developing new technologies for obtaining highly efficient phosphors.
Expected and achieved results	1. Obtaining new materials based on CaBPO5:Eu with increased luminescence efficiency and controlled emission color. 2. Identifying patterns of influence of various isomorphic substitution schemes on the luminescent properties of CaBPO5:Eu. 3. Creating a basis for developing new technologies for obtaining highly efficient phosphors.
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Использование	Their unique structural and optical properties make them potentially useful in a wide range of applications: Luminescent devices: LEDs, lasers, fluorescent lamps, etc.; Radiation detectors: Scintillators for detecting

	ionizing radiation; Biomedical applications: Fluorescent labels for bioimaging.
Приоритет в сравнении с реальными аналогами	In the process of implementation
List of publications with links to them	In the process of implementation
Patents	In the process of implementation