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LUMINESCENT PROPERTIES OF THE La1-xSmxVO4:Ca NANOPARTICLES

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The Eu3+-doped vanadate luminophores are widely used in optoelectronic devices for more than 50 years. At the last years, a great attention was also paid to investigation of vanadate matrices with other rare-earth luminescent activators, in particular - Sm3+ ions. In this paper we report results of synthesis and investigation of the Ca2+-doped La1-xSmxVO4 ($0.05 \leq x \leq 0.2$) nanoparticles synthesized by sol-gel method. The phase composition and crystal lattice parameters were controlled using XRD analysis. The obtained samples possess multiphase composition of mixed monoclinic and tetragonal structure. Content of the tetragonal LaVO4 phase is increased with increase of Sm3+ concentration.

Emission of the investigated samples is observed in the 550 – 725 nm spectral range and it shows narrow spectral lines. These lines can be assigned by their position to electron transitions in the Sm3+ ions. Excitation spectra consist of the broad band in 250 – 350 nm spectral range which caused by transitions in the VO43- groups and narrow bands in the 350 – 510 nm spectral ranges caused by the f-f transitions in the Sm3+ ions. It was found that changes in crystal phases influence fine structure of the emission and excitation spectra of the La1-xSmxVO4:Ca nanoparticles, whereas Ca-doping leads to formation of additional Ca-induced centers of luminescence excitation.

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Topics

Session A. Physics of condensed matter and spectroscopy

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