


Synthesis and Investigation of La,Ca -Doped EuVO_4 Nanoparticles with Enhanced Excitation by Near Violet Light

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Abstract

The paper reports experimental results on features of crystal structure and luminescent properties of the $\text{Eu}_{1-x}\text{Ca}_x\text{VO}_4$ nanoparticles synthesized for the first time. The $\text{Eu}_{1-x}\text{Ca}_x\text{VO}_4$ compounds with $x = 0, 0.05, 0.1, 0.15,$ and 0.20 are prepared by aqueous nitrate–citrate sol–gel synthesis. The obtained samples are characterized by XRD analysis. The $\text{Eu}_{1-x}\text{Ca}_x\text{VO}_4$ samples are crystallized in tetragonal structure. Phase composition of the sample depends on the x value. Increasing concentrations of the calcium ions leads to formation of the EuVO_4 and CaV_2O_6 phases' mixture. Luminescence properties of the synthesized $\text{Eu}_{1-x}\text{Ca}_x\text{VO}_4$ nanoparticles are considered in comparison with properties of the $\text{La}_{1-x-y}\text{Eu}_y\text{Ca}_x\text{VO}_4$ nanoparticles. Formation of two types of emission centers and arising of additional excitation band near 400 nm are observed for the both compositions. It is shown that second types of the emission centers have different structure and spectral characteristics for the $\text{Eu}_{1-x}\text{Ca}_x\text{VO}_4$ and $\text{La}_{1-x-y}\text{Eu}_y\text{Ca}_x\text{VO}_4$ nanoparticles, whereas the 400 nm excitation band has the same origin for the both compositions.