SYNTHESIS OF NEW COMPOSITION PRASEODYMIUM DOPED LUTETIUM AND GADOLINIUM ALUMINUM GARNETS MODIFIED BYSCANDIUM AND BORON ELEMENTS TO IMPROVE LUMINESCENCE PROPERTIES

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In order to convert high energy radiation, such as gamma or X-rays, into visible light scintilla-tors are needed. Praseodymium doped lutetium aluminum garnets have high density, thermal stability, rather efficient luminescence processes which are needed for a good scintillator. However, further optimization of short decay time is needed. Luminescence decay is important because if it is very short then more signals can be measured within a defined timeframe, resulting in a better resolved and higher quality image in CT devices. One way to improve materials' properties is to doping compounds with different elements. One of these elements is boron. Boron can be used as a flux, also B3+ has a suitable neutron capture cross section and can help absorb gamma radiation [1-3]. Lutetium aluminum scandium garnets doped with Pr3+ and/or B3+ were obtained as a result. These garnets are synthesized and studied for the first time. In this work, the phase purity and morphology of the samples were analyzed with X-ray diffraction, SEM. Photoluminescence properties such as emission, excitation spectra, decay curves, quantum efficiency and temperature dependency spectra have been investigated. Radioluminescence was also measured. The positive impact of boron addition into the garnet structure on the luminescence properties will be discussed in detail.

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