



Radioluminescence of Lu_2O_3 : Eu nanocrystalline powder and vacuum-sintered ceramic.

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Streszczenie

Nanocrystalline powders of Lu_2O_3 :Eu with the activator content varying in the range of 0.2–10% were prepared through a combustion technique. The powders were only slightly agglomerated and the size of crystallites were about 30nm. Some of the powders were co-doped with Mg, Ca, Sr, Ba, La of various concentrations. Such powders were cold-pressed and sintered at 1750°C for 5h in vacuum. X-ray-excited luminescence spectra of both the powders and the sintered ceramics were recorded and the efficiency was compared to the commercial standard Gd_2O_3 :Pr,Ce,F X-ray phosphor. It was found that the nanocrystalline powders of Lu_2O_3 :Eu,Ca emit photons four-times less than the commercial micron-sized Gd_2O_3 :Pr,Ce,F powder. In the case of sintered materials the emission efficiency from our Lu_2O_3 :Eu5%, Ca was roughly equal to the efficiency of the commercial-sintered Gd_2O_3 :Pr,Ce,F. The co-doping ions were shown to have various effects on the transparency of the sintered Lu_2O_3 :Eu. Mg hindered the sintering process producing completely opaque pellets. Other ions facilitated the sintering course and the best results were obtained by co-doping the samples with 0.5% of Ba. Sr and La also significantly stimulated the sintering and the final pellets were only slightly cloudy.

Słowa kluczowe

Lu_2O_3 , Luminescence, Radioluminescence, X-ray phosphor

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