



Preparation, structural and spectroscopic studies of $(Y_xLu_{1-x})_2O_3:Eu^{3+}$ nanopowders.

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Streszczenie

Lutetium and yttrium oxides are promising scintillating materials suitable for use in medical planar X-ray imaging and mammography. In this paper the procedure for preparation of europium doped mixed lutetium–yttrium oxide nanopowders using polymer complex solution synthesis method is presented. Detailed information on nanopowder phase, morphology and crystallinity are obtained using X-ray powder diffraction, SEM and TEM while optical properties are investigated by photoluminescence and radioluminescence measurements. Constituting nanoparticles are 20–40 nm in size, and have excellent structural ordering in cubic bixbyite-type. Unit cell parameter, ionic coordinates, crystal coherence size and microstrain are determined from Rietveld analysis. All powders show strong Eu^{3+} -characteristic red emission, with an average 5D_0 emission lifetime of 1.5 ms. Radioluminescence efficiency is about 15% of the commercial micron-sized $Gd_2O_3S:Eu^{3+}$ powder while negligible level of afterglow is found.

Słowa kluczowe

Scintillators, rare earths, photoluminescence, radioluminescence

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