Size effects in the low temperature spectroscopy of Lu_2O_3 nanopowders.

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Streszczenie

Powder samples of Lu_2O_3 with the following mean size of crystallites: 6 nm, 50 nm and 150 nm were structurally and spectroscopically characterized. XRD patterns and TEM images as well as luminescence, luminescence excitation and reflectance spectra were recorded. The measurements revealed profound differences in luminescent properties of the three specimens and basically all the variations scaled with the size of crystallites. For larger particles complex luminescence spectra with at least four components around 255 nm, 317 nm, 340 nm and 450 nm were observed. For the smallest crystallites only the last two, defect-related constituents could be recorded. Excitation into the host-lattice fundamental absorption, below 210 nm, was progressively less effectively converted into luminescent photons as the crystallites were getting smaller. Excitation and reflectance spectra did not show any signs of quantum confinement down to 6 nm.

Słowa kluczowe

Nanocrystals, Luminescence, Surface effects, Quantum confinement, Defects

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