Structural and spectroscopic characterization of Lu_20_3: Eu nanocrystalline spherical particles.

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Spherical particles of Lu2O3:x%Eu,withxvaryingfrom 0% to 10% withrespect to Lu, were prepared by precipitating hydroxides with urea at 80◦Candsubsequently decomposing these hydroxides to oxides at 650◦C.TEM picturesrevealed that the spherical particles were very uniform in size and their diameterswere about 130 nm. Each of the particles consisted of crystallites about 20 nm indiameter. Luminescence and excitation spectra contained all the characteristicfeatures of the Eu3+ion. The most intense line in the emission was locatedaround 611 nm. Energy transfer was observed from the Eu3+ions occupyingthe S6(C3i)centrosymmetric site to the Eu3+located in the non-centrosymmetricposition of C2symmetry. The decay kinetics were slightly non-exponential,especially for the lowest dopant concentrations. At liquid nitrogen temperaturethe average decay time for the 0.2% powder was shorter by about 40% comparedto the 3–10% materials. At room temperature the average decay time varies onlyslightly. Rise times were observed for allconcentrations at room temperaturebutonly for higher concentrations at liquid nitrogen temperature. This effectisincontrast to that of nanoparticles of Lu2O3:Eu prepared using differentsynthesis procedures.

Adres publiczny

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