198h Nanodesigning of Gdsio5: Eu^{3+}Particles Obtained by Spray Pyrolysis Method and Their Luminescence Properties

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Theoretical model describing the mechanism of droplet formation and structure of $GdSiO_5:Eu^{3+}$ spheres prepared by the process of ultrasonic spray pyrolysis, using colloidal solution consisting of the 7.5 nm SiO_2 nano-particles and gadolinium and europium nitrate as a precursor, is developed. The proposed model quantitatively defines each line in the size distribution spectrum. Agreement between theoretically obtained basic structural parameters (size distribution and geometry) and experimentally determined values was found. Luminescence and phosphorescence properties in such structured powders and thin films are investigated. It is shown that very intense emission spectra can be obtained for mixture of 1M silica and stoichiometric quantity of gadolinium for obtaining $GdSiO_5$ doped with 1 at.% Eu. Very clear, magnetic –dipole transition $^5D_0$ - $^7F_1$ at 590 nm, electrical hypersensitive transition $^5D_0$ - $^7F_2$ at 620 nm, red shifted in our case to 613 nm, as a transitions $^5D_0$ - $^7F_3$ and $^5D_0$ - $^7F_4$ at 653 nm and 707 nm, respectively, are appeared.