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Novel method for the synthesis of Dy-doped yttrium disilicate phosphors

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Yttrium disilicate (Y2Si2O7) displays interesting structural properties because of its high refractoriness and stability in oxidizing environments. With its wide band gap and excellent thermal and chemical stability, it has been shown to be one of the most efficient host lattices for rare earth ions, which substitute Y3+ ions. When it is doped with different metallic ions, yttrium silicates exhibit attractive luminescent properties for potential applications, such as plasma displays, laser materials and high-energy phosphors. The use of solid-state reaction for yttrium disilicate synthesis shows disadvantages such as long times and temperatures of processing and formation of undesirable by-products. The objective of this work was to obtain silica (SiO2) nanoparticles by surfactant-assisted sol-gel process, using sodium silicate (Na2SiO3) as Si precursor, and its application on the synthesis of yttrium disilicate-based (Y2Si2O7) phosphors. Yttrium hydroxide was added to obtained silica nanoparticles, by precipitation from yttrium nitrate. Two precursors of yttrium disilicate were prepared: un-doped and doped with dysprosium 2,5 at %, (Y1,95Dy0,05Si2O7). The obtained powders were characterized by X-ray diffraction (XRD), to identify the polymorphic phases of yttrium disilicate, scanning electron microscopy (SEM), to observation of morphology. and luminescence spectroscopy. It was observed that ?-phase of Y2Si2O7 was obtained at 1300°C and showed sharper luminescence peaks in comparison with ?-phase.