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PROCEEDINGS

Synthesis and characterization of nanostructured luminescent materials with potential application in optical and optoelectronic devices

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The search for efficient light emitting materials, which are easy to synthetize using simple routes, is an important issue for the design of new optical and optoelectronic devices. In this sense, compounds such as, Ag-doped zinc sulfide, zinc silicate or strontium aluminates doped with Mn, have received notable attention for their fundamental features, including photoluminescent and electroluminescent properties, synthesis versatility, and potential application in several technological fields. In this work, we propose the synthesis and characterization of three different nanostructured luminescent materials, emitting in specific regions of the visible spectrum. Nanostructured materials are synthed with temperatures, processing times and heating rates appropriate to each system [1]. Nanocrystalline oxide materials (Mn-doped strontium aluminates – red emission) can be prepared by polymeric precursor method, which is based on the formation of an organic polymeric network obtained through the preparation of a viscous solution that is converted into a thermoplastic gel with the concentration of the solution. The goal is to reduce the mobility of cations by distributing them homogeneously in the polymer chain. In order to obtain the nanostructured phosphor materials, the co-precipitation method were used for Zn_2SiO_4:Mn systems (green emission). In this method, suspensions are obtained, based on the hydrolysis of an alkoxide or salt of the metals of interest. Finally, we use the conventional solvothermal method to synthetize Ag-doped zinc sulfide powder (blue emission). The prepared samples were characterized using optical spectroscopy techniques and scanning electron microscopy. These first results are promising for future applications in optics and optoelectronic devices.

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References:

[1] C. A. Charitidis, P. Georgiou, M. A. Koklioti, A-F. Trompeta and V. Markakis. Manufacturing Rev. 1, 11 (2014).