Área: MAT

Synthesis of $CdSiO_3:Pr^{3+}$ and co-doped $CdSiO_3:Mn^{2+}Pr^{3+}$ by a hydrothermal method

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Highlights

A Hydrothermal method was successfully applied to obtain phosphors with persistent luminescence of $CdSiO_3$:Pr, $CdSiO_3$:Mn and co-doped $CdSiO_3$:Pr,Mn

Resumo/Abstract

Materials with Persistent luminescence are materials of great interest, with a vast application range due to their property of light emission for long periods. Cadmium silicates are usually synthesized via solid state, using high temperatures above 1050ºC, but there are disadvantages, such as high-energy cost and particle agglomeration[1]. The hydrothermal method is a good alternative because it allows for mild reaction conditions and interesting morphologies[2]. Cadmium metasilicate was obtained as a single phase and also doped with Mn^{2+} and Pr^{3+} using the hydrothermal method: 50ml of a solution of $CdCl_2$ were added to a 50ml solution of Na_3SiO_4 in water with a stoichiometric proportion of 1:1. The doping materials $MnCl_2$ and $PrCl_3$ where added together with the cadmium precursor in a molar proportion of 1% Mn and 0,5% Pr . pH was adjusted to 6 using HCl. The mixture was stirred during 20 minutes and afterwards added in a Teflon-lined autoclave filled to 70% of its total volume and heated at 180ºC for 24 h. Two temperatures of calcination were used: 600ºC and 800ºC at 4h. The samples were characterized using x-ray diffraction (XRD) and emission and excitation spectra were obtained.

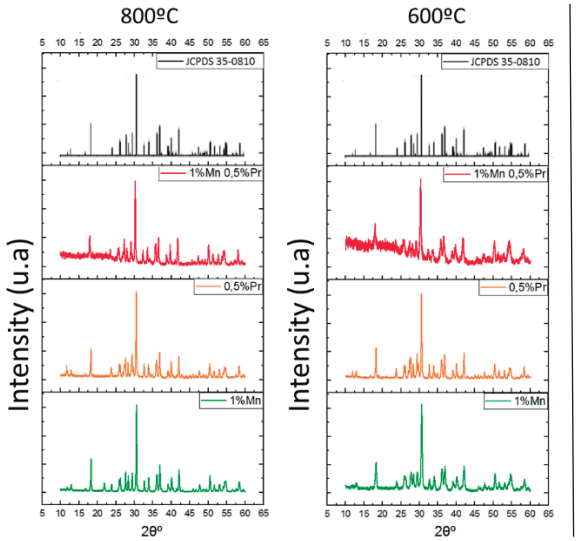

Figure 1. XRD diffractograms of samples

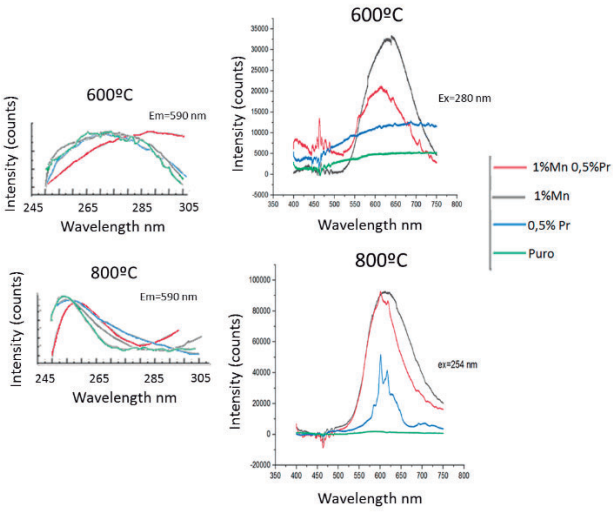

Figure 2.Emission and Excitation spectra

The excitation spectra (fig.2) show excitation wavelengths at 254 nm and 280 nm for samples calcined at 800ºC and 600ºC, respectively. The emission spectra follow the same order of intensity between the temperatures but with a higher intensity for samples at 800ºC. The samples calcined at 600ºC also show an emission at 450 nm, associated with the matrix $CdSiO_3$.

[1] A. Jain et al; *Renewable and Sustainable Energy Reviews* **65** (2016) 135-153

[2] C. Manjunatha et al./ *J. Mater. Chem.*,**22** (2012), 22392-22397

Agradecimentos/Acknowledgments

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