White emission properties of Dy^{3+}-doped Sr_2CeO_4 obtained via acid citric route

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Rare earths ions (RE^{3+}) are present in the most important technological devices. They are used in photonic areas due its photoluminescence properties, resulted from *f-f* transitions or charge transfer processes. Two decades ago,Sr_2CeO_4it was highlighted due its luminescence properties at the blue region in the electromagnetic spectra, attributed to the charge transfer between Ce^{4+} and O^{2-}.[1] Its emission at 485 nm makes these materials applicable as blue phosphors, and its long lifetime time (around ms) it's a important parameter for application in illumination devices. Recently studies have focused in to obtain white emission using this material, and co-doping with another RE^{3+} have been reported as a source of white light. Dy^{3+} can be used due its peculiar emissions at blue, yellow and red regions assigned to its transitions from$^4F_{9/2}$to $^6H_{15/2}$ (484 nm), $^6H_{13/2}$ (572 nm) and $^6H_{11/2}$ (668 nm)levels.[2]In current work Sr_2CeO_4 was obtained by combustion process using citric acid as precursor.Dy^{3+}at 0.5; 1.0 and 1.5 mol% was used as doping. Ag^+ was used to avoid secondary phases formation. The crystallinity was obtained by heat-treatment at 1100 °C. XRD shows reflections assigned to the Sr_2CeO_4phases formation. Photoluminescence analysis reveal excitation bands at 270 and 340 nm, assigned to Dy^{3+} and Sr_2CeO_4 absorption bands, respectively. Fixing excitation at these wavelengths all materials shows a wide band with maximum at 485 nm assigned to Sr_2CeO_4 luminescence, and emission bands at 480, 572 and 660 nm characteristic of Dy^{3+} transitions. Dy^{3+} at 1 mol% shows ideal to favors its luminescence when embedded into Sr_2CeO_4 structure.CIE plotings reveal chromaticity at bluish green, greenish blue and white regions. The decay curves reveal that Dy^{3+} in the Sr_2CeO_4 presented lifetime values between 0.23 and 0.28 ms. In summary, it was possible to obtain Dy^{3+}-doped Sr_2CeO_4 from an easy route using citric acid and Ag^+. Dy^{3+} provokes the shift the emission color of Sr_2CeO_4 from blue to white region. Dy^{3+}-doped Sr_2CeO_4 shows color coordinates closer to the white region and high lifetime values, what make these materials potential in the development of phosphors for lighting.

1Danielson, E. et al. *J. Mol. Struct.*, **1998**, 470, 229.

2Rocha, L. A. et al. *J. Am. Ceram. Soc.* **2016,** DOI 10.1111/jace.14316.

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