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The role of Zn2+ ion on the optical properties of novel Ba1-xZnxZrO3: Mn perovskite

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This work presents the effect of Zn2+ ion concentration on the optical properties of a newly formulated perovskite with or without a dopant. The Ba1-xZnxZrO3 perovskite was synthesized using the solution combustion technique. The scanning electron micrographs show particles with irregular shapes which agglomerated into a dense structure. The sizes of the particles were in the range 30 to 75 nm. X-ray diffraction measurement gave pure cubic perovskite structure at all concentrations of the Zn ion. Photoluminescence excitation spectra show a slight red-shift of the excitation band due to the presence of Zn2+ ions. The doped perovskite show strong emission of Mn2+ ion at 585 nm and the intensity of this band increases with increasing concentration of Zn2+ ion. The possible reason for this enhancement of emission intensity of Mn2+ ion is the substitution of the ion at Zn2+ ion's site due to the similarity of their ionic radii. The International Commission on Illumination (CIE) coordinates confirm the orange-light emission of the doped perovskite. The Ba1-xZnxZrO3 host can be effectively applied in solar cells, photocatalysis and as a host matrix for efficient phosphors. The Ba1-xZnxZrO3: Mn perovskite is therefore is a good orange-coloured light emitter which can be effectively excited by a near UV source such as LED.

Summary

perovskite, orange light, combustion synthesis, photoluminescence, optical properties

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