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Influence of partial anionic substitution on luminescence properties of CaMoO₄:Eu³⁺ compounds as solid state LED phosphors.

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A solid state method was used to prepare CaMoO₄, CaMoO₄:Eu³⁺, CaMoO₄-BO,₃:Eu³⁺,CaMoO₄-PO₄:Eu³⁺ and CaMoO₄-SO₄:Eu³⁺ powder phosphors. X-ray Powder diffraction (XRD), UV-Vis absorption spectroscopy, scanning electron microscopy (SEM) and photoluminescence (PL) spectroscopy were used to characterize the powders. The XRD results indicate that the substitution of anions (BO₃²⁻,PO₄²⁻and SO₄²⁻) and Eu³⁺ dopant ion did not affect the crystal structure of the CaMoO₄ phosphors, but greatly influenced the PL intensities of the CaMoO₄:Eu³⁺ phosphors. The luminescence spectra, excited at 395 nm using a monochromatized xenon lamp, for the four different CaMoO₄:Eu³⁺ phosphors were recorded. The PL spectra showed an intense red emission at 615 nm belonging to the ⁵ D₀ -> ⁷ F₂ electric dipole transition. The highest PL intensity was observed from CaMoO₄-SO₄:Eu³⁺ sample. The decay curves were recorded when monitoring the 615 nm emission. All the decay curves were single exponential and lifetimes remain constant with a value in region of 430 microsecond (μs). The calculated CIE (Commission Internationale de l'Eclairage) confirmed that the emission color was lying in the red region. The PL data suggest that our materials have potential application as source of red light in red light emitting diode.

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MSc

Main supervisor (name and email)
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