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# Enhanced luminescent properties in $\text{Eu}^{3+}$ -activated $\text{SrMo}_x\text{W}_{1-x}\text{O}_4$ red-emitting phosphors for solid-state lighting and field-emission displays

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## Abstract

We fabricated the trivalent  $\text{Eu}^{3+}$ -activated  $\text{SrMo}_x\text{W}_{1-x}\text{O}_4$  phosphors by a high-temperature solid-state reaction technique. The prepared phosphors were characterized by X-ray diffraction, field-emission scanning microscopy, luminescence decay curves, photoluminescence (PL) spectra, and cathodoluminescence (CL) spectra. Under the ultraviolet (UV) illumination, the emissions of  $\text{Eu}^{3+}$  ions with an intense peak at 615 nm were observed, indicating the  $\text{Eu}^{3+}$  ions occupied at the low symmetry sites without inversion in host lattices. With the addition of the  $\text{Mo}^{6+}$  ions, the emission intensity of the studied samples was increased and the optimum result was detected when  $x = 0.9$ . The temperature-dependent PL emission spectra were measured to explore the thermal stability of the resultant compounds. The final products can emit visible red emissions with high color purity of 95.1%. The CL spectra revealed that the synthesized compounds also exhibited superior CL performance. These characteristics make the  $\text{Eu}^{3+}$ -activated  $\text{SrMo}_x\text{W}_{1-x}\text{O}_4$  red-emitting phosphors a promising candidate for UV-based white light-emitting diode and field-emission display applications.

**Keywords:** Phosphors, Luminescence, Cathodoluminescence, UV excitation.

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