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Structural, Vibrational, Optical and Improved Photoluminescence Properties of Dy³⁺ Doped Ca₂KZn₂V₃O₁₂ Phosphors(Article)

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Abstract

A series of dysprosium (Dy³⁺) ion doped Ca₂KZn₂V₃O₁₂ phosphors were explored which exhibits a broad band and sharp peaks in the visible region under the ultraviolet light excitation. Fourier transform infrared (FTIR) spectra and the optical diffuse reflectance spectra were ascribing the formation of the distorted VO₄ tetrahedral group due to the influence of Dy³⁺ ions. Moreover, a tunable luminescence color was achieved by doping of Dy³⁺ ion in the Ca₂KZn₂V₃O₁₂ phosphor. Through doping concentration optimization, the Ca₂KZn_{1.9}Dy_{0.1}V₃O₁₂ phosphor was observed for high color rendering index (CRI) and excellent correlated color temperature (CCT) with cool white emission. Hence, in the designing of the VO₄ → Dy³⁺ energy transfer that is capable of converting ultraviolet light into efficient white light, this phosphor is suitable for solid-state lighting applications. © 2020, Springer Science+Business Media, LLC, part of Springer Nature.

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[f-f transition](#) [Luminescence](#) [Solid state reaction](#) [Vanadate garnet](#) [W-LEDs](#)

Indexed keywords

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[Calcium compounds](#) [Color](#) [Energy transfer](#) [Fourier transform infrared spectroscopy](#) [Ions](#) [Light emission](#) [Lighting](#) [Phosphors](#) [Ultraviolet radiation](#) [Zinc compounds](#)

Engineering uncontrolled terms

[Correlated color temperature](#) [Diffuse reflectance spectrum](#) [Fourier transform infrared](#) [High color rendering index](#) [Photoluminescence properties](#) [Solid-state lighting application](#) [Tunable luminescences](#) [Ultraviolet light excitation](#)

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