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Structural, Vibrational, Optical and Improved Photoluminescence Properties of Dy^{3+} Doped $Ca_2KZn_2V_3O_{12}$ Phosphors(Article)

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Abstract

A series of dysprosium (Dy^{3+}) ion doped $Ca_2KZn_2V_3O_{12}$ 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 VO_4 tetrahedral group due to the influence of Dy^{3+} ions. Moreover, a tunable luminescence color was achieved by doping of Dy^{3+} ion in the $Ca_2KZn_2V_3O_{12}$ phosphor. Through doping concentration optimization, the $Ca_2KZn_{1.9}Dy_{0.1}V_3O_{12}$ 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 $VO_4 \rightarrow Dy^{3+}$ 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.

Author keywords

f–f transition | Luminescence | Solid state reaction | Vanadate garnet | W-LEDs

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