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Facile synthesis, vibrational, optical and improved luminescence properties analysis of $Ca_2KZn_2V_3O_{12}$ phosphor(Article)

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Abstract

A self-activated $Ca_2KZn_2V_3O_{12}$ (CKZVO) phosphor was synthesized by the solid state reaction method under different calcination temperatures. A high crystalline single-phased CKZVO material occurred at 600 °C belongs to the cubic structure with Iad space group. The vibrational modes were characterized by IR and Raman spectra. All the samples consist of intense absorption spectra in UV region owing to charge transfer of $(VO_4)^{3-}$ tetrahedral group and the band gap energy of the single-phased CKZVO phosphor was found to be 3.2 eV. Photoluminescence broad emission spectrum ranging from 400 to 700 nm, ascribing to the charge transfer in $(VO_4)^{3-}$ tetrahedral group. The colorific properties of the single-phased CKZVO phosphor was investigated and reported. Ultimately, the device performance showed that the self-activated $Ca_2KZn_2V_3O_{12}$ phosphor served as a potentially applicable candidate in UV chip excited white LED applications.

Author keywords

photoluminescence | self-activated | solid-state reaction | white LEDs

Indexed keywords

Engineering controlled terms: Charge transfer | Emission spectroscopy | Energy gap | Light emitting diodes | Photoluminescence | Solid state reactions

Engineering uncontrolled terms: Calcination temperature | Device performance | Emission spectrums | IR and Raman spectra | Luminescence properties | self-activated | Solid state reaction method | White LED

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