Structural, luminescence, and energy transfer properties of Dy3+/Tb3+ co- doped Ba1.3Ca0.7SiO4 ceramic based phosphors for solid-state lighting application

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The T-phase-Ba1.3Ca0.7SiO4 co-doped with 0.03mol% Dy3+ and different concentration of Tb3+ ions from 1-5mol% were prepared by the solution-combustion method. The structural and morphological properties of the prepared samples were examined by XRD and SEM. The effect of Tb3+ ion concentration on the spectroscopic properties of Dy3+/Tb3+ co-doped Ba1.3Ca0.7SiO4 single crystal was explored by using photoluminescence excitation, emission, and decay curve. In this system, the energy transfer process Dy3+: 4F9/2+Tb3+: 7F6⁡Dy3+: 6H15/2+Tb3+: 5D4 took place in the way that Dy3+ ion acts as a sensitizer for Tb3+ ions emission under excitation of UV lights. Furthermore, a fitting of the emission decay curve at 575 nm by the Inokuti–Hirayama expression suggested that the dipole-dipole energy transfer from Dy3+ to Tb3+ was dominated. The characteristic emission colors of the prepared crystal were estimated. The chromaticity coordinates were determined from the measured emission spectra and they are located at the green and white light regions. Hence, the emission color adjusted from the white to green region by varying Tb3+ ion concentrations under the excitation of UV light.

Biography

Desta Regassa has completed his Masters of Science in Laser Spectrroscopy Physics from AddisAbaba University in July, 2012 when his age was 23 and Currently studying his PhD at the Univeristy of Free State, South Africa. He has published more 3 papers in reputed journals.

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