

Synthesis and Luminescent Properties of RE^{3+} (Eu^{3+} and Tb^{3+}) Ions Activated $CaGd_4O_7$ Novel Phosphors

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Trivalent rare-earth ($RE^{3+}=Eu^{3+}$ and Tb^{3+}) ions activated $CaGd_4O_7$ phosphors were synthesized by a sol-gel process. After annealing at $1,500^{\circ}C$, the XRD patterns of the phosphor confirmed their monoclinic structure. The photoluminescence excitation spectra of Eu^{3+} and Tb^{3+} doped $CaGd_4O_7$ phosphor shows the broad-band excitations in the shorter wavelength region due to charge transfer band of completely filled O^{2-} to the partially filled Eu^{3+} ions and f-d transitions of Tb^{3+} ions, respectively. The photoluminescence spectra show that the reddish-orange ions and green emission for Eu^{3+} and Tb^{3+} ions, respectively. Owing to the importance of thermal quenching property in the technological parameters, the temperature-dependent luminescence properties of these phosphors were measured for examining the suitability of their applications in the development of light emitting diodes (LEDs). In addition to those measurements, the cathodoluminescence properties were examined by changing the acceleration voltage and filament current. The calculated chromaticity coordinates of these phosphors were close proximity to those of commercially available phosphors for LED and field emission display devices.

Keywords: novel phosphors, rare earth ions, red and green emission