

SESSION 7: OTHERS, SALON F

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White light by nano-halo-phosphor

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ABSTRACT

The new trivalent dysprosium-activated KMgSO_4F phosphor is synthesized *via* solid state diffusion (SSD) and centrifuge synthesis route (CS). CS route is simple and requires low temperature. XRDs of the phosphor synthesized by two different routes are compared. The peaks in XRD are observed at the same position, but when the sample is prepared by CS route, it is showing the broadening of the emission lines; hence, the grain size measurements are carried out, using Debye Scherer formula and calculated values come out to be approximately 11 nm, which is in nanosize. No standard JCPDS file for this phosphor is available for possible matches.

Photoluminescence in the present host, Dy^{3+} emission is observed at 484 nm (blue) and 578 nm (yellow) due to $^4\text{F}_{9/2} \rightarrow ^6\text{H}_{15/2}$ and $^4\text{F}_{9/2} \rightarrow ^6\text{H}_{13/2}$ transition, respectively, when excited by light of wavelength of 350 nm. PL peaks are seen at the same wavelengths when phosphor is synthesized by two different methods, only it shows variation in intensity. The PL intensity increases linearly with increase in concentration of dopant till 0.5 mole%.

CIE chromaticity coordinates of the $\text{KMgSO}_4\text{F}:\text{Dy}^{3+}$ phosphor represented for wavelengths 484 and 578 nm (x , y) are observed as ($x = 0.33$, $y = 0.34$), calculated using the colour calculator program radiant imaging, which are close to the NTSC and PAL standard values for white light.

The present study leads into the conclusion that $\text{KMgSO}_4\text{F}:\text{Dy}^{3+}$ can be synthesized in nanosize by CS route. The CIE chromaticity coordinates indicate that the phosphor $\text{KMgSO}_4\text{F}:\text{Dy}^{3+}$ might find a possible application in white LEDs.

KEYWORDS: luminescence in nano-halo-phosphor