



Progress Seminar

Seminar : Design and synthesis of novel red/orange-red emitting phosphor with $(\text{LiCaLa}(\text{MoO}_4)_3\text{RE}_3^+)$, RE = Eu, Sm) with Scheelite structure for
Title Solid state lighting applications.

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Venue : Seminar Room, Chemistry Department.

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Abstract : Novel oxide based red and orange-red phosphor with negligible concentration quenching is bottle neck for the solid state lightings. In this context, a series of red, orange-red $\text{LiCaLa}_{1-x}\text{Eu}_x(\text{MoO}_4)_3$ and orange-red $\text{LiCaLa}_{1-x}\text{Sm}_x(\text{MoO}_4)_3$ emitting phosphors were synthesized and studied their optical properties. Systematically, the photoluminescence (PL) study reveals that the Eu^{3+} substituted phosphor emits red light due to ($^5\text{D}_0$ - $^7\text{F}_2$) transition with zero concentration quenching. The Photoluminescence excitation (PLE) and PL study reveal that the phosphor composition showed broad absorption (due to O-Mo, O-Eu (Charge Transfer bands) and narrow band absorption bands (due to 4f-4f electronic transition of Eu^{3+} ion). The PL emission also reveals that the phosphors showed extremely narrow band emission at 615 nm (FWHM 5-10 nm) with high color purity. The dominant emission of red line implies that the Eu^{3+} ion occupies the non-centrosymmetric site. Whereas Sm^{3+} activated phosphor showed deep orange-red emission due to ($^4\text{G}_{5/2}$ - $^6\text{H}_{9/2}$). All the compositions are crystallized in scheelite structure having tetragonal structure and $I4_1/a$ space group. The red light emitting diodes (LEDs) were designed for the $\text{LiCaEu}_{0.05}(\text{MoO}_4)_3$ red phosphors with the near ultraviolet (NUV) LED chip. White LED also been fabricated by conjugating the blue LED with yellow dye + red phosphor and the LED which shows CCT (4762 K), CRI (81%), CIE (0.34, 0.33). The detail results will be presented and discussed.