

Seminar Title	: Photo physical properties of new Lanthanide based phosphor for solid state lightening.
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Venue	: Seminar room, Chemistry department in hybrid mode (google meet code: vtu-xpjjg-uyb).
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Abstract	: The work discussed in the thesis is about systematic investigation of synthesis and optical properties of new lanthanide-based phosphors to overcome the challenges of traditional lighting sources. The conventional light sources were developed based upon YAG: Ce <sup>3+</sup> phosphor but due to the absence of the red component it suffers from low CRI and high CCT. Thus we developed different red phosphors using the traditional solid state heating method. We chose molybdate and tungstate-based phosphor doped with trivalent Europium and trivalent Samarium activator ions. These phosphors showed good quantum yield and high luminous intensity. Null concentration quenching was found in fully substituted LiCaLa <sub>(1-x)</sub> (MoO <sub>4</sub> ) <sub>3</sub> :xEu <sup>3+</sup> phosphor. It shows thermal stability of 88.53% at 150°C and high quantum yield of 44.50%. All the phosphors were characterized with XRD, PL, SEM, lifetime and temperature-dependent photoluminescence spectroscopic and imaging methods. Judd-ofelt parameters were calculated to know about the environment around the Eu <sup>3+</sup> ion. The asymmetric ratio gives information about the intense red emission. In the Eu <sup>3+</sup> ion the <sup>5</sup> D <sub>0</sub> & rarr <sup>7</sup> F <sub>2</sub> transition dominates the <sup>5</sup> D <sub>0</sub> & rarr <sup>7</sup> F <sub>1</sub> . Red emission in the phosphor occurred due to electric dipole transition than magnetic dipole. Further, white LED was fabricated using blue LED, red phosphor and yellow dye. Again Sm <sup>3+</sup> and Eu <sup>3+</sup> co-doped phosphor were synthesized and deep orange-red LED was fabricated using near UV LED for plant growth application. In the similar manner, series of LiCaY <sub>(1-x)</sub> (MoO <sub>4</sub> ) <sub>3</sub> , LiCaEu(MoO <sub>4</sub> ) <sub>3-x</sub> (WO <sub>4</sub> ) <sub>x</sub> and LiBaCaSrEu <sub>2.7</sub> Gd <sub>0.3</sub> (MoO <sub>4</sub> ) <sub>8</sub> phosphors were synthesized and their optical properties were investigated. Solid solution for LiCaEu(MoO <sub>4</sub> ) <sub>3-x</sub> (WO <sub>4</sub> ) <sub>x</sub> indicates molybdate gives better results in terms of concentration quenching, quantum yield and other properties. LEDs have been fabricated with the above phosphors and their CCT, CRI and CIE values confirms that these are good red phosphor give better results in comparison with commercial available phosphors.