



Contribution ID: 327

Type: **Either**

CaWO₄:Eu(III) based phosphors, characteristics and novel applications

The synthesis and characterization of calcium tungstate-based micro-nanophosphors will be presented. These materials were prepared using the spray pyrolysis technique. Based on Scanning Electron Microscopy measurements, both CaWO₄ and CaWO₄:Eu (III) exhibit a quasi-spherical shape. CaWO₄ displays blue luminescence originating from electron transitions within unperturbed WO₄ complexes. In contrast, the luminescent properties of CaWO₄:Eu (III) arise from the presence of Eu(III) ions, which emit light at wavelengths of 591, 615, 655, and 702 nm. These emissions stem from radiative transitions from the excited state ⁵D₀ to ⁷F_j (j =1,4) inter-level transitions within the electronic energy states of Eu (III) [1].

These phosphors undergo testing in three different scenarios to explore potential and innovative applications. The first scenario involves blending them with a commercial 3D printing photocurable resin (Sain Smart 101-90-840TS) and infusing the resin with their luminescent properties, resulting in a 3D luminescent photocurable resin emitting red light. In the second scenario, the phosphors are incorporated into transparent glasses to create Phosphor in Glasses (PIGs), a concept currently under investigation for laser applications [2]. Finally, the third scenario involves utilizing the phosphors for the Visualization of Latent Fingerprint, leveraging the excellent powder luminescent characteristics of CaWO₄, which has been previously employed for this purpose [3].

Keywords

CaWO₄:Eu (III), 3D luminescent photocurable resin, Phosphor in Glasses (PIGs),

Reference

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- [2] Yueyuan Liang, et. al., *Journal of Materials Chemistry C*, 2021, 9, 12751-12758
- [3] Devidas S., et. al., *Analysis Materials Horizons: From Nature to Nanomaterials*. Springer (2023)143–155

This work was supported by

CONAHCyT

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Session Classification: LUMINESCENCE PHENOMENA

Track Classification: Luminescence Phenomena: Materials and Applications