Contribution ID: **1985** Type: **Poster**

Fabrication and Characterization of Luminescent Polymer Nanocomposite Films

Monday 27 October 2025 18:30 (20 minutes)

Nanopowders were synthesised via the precipitation method, annealed, and incorporated into a polycaprolactone (PCL) matrix through solution casting with acetophenone as solvent to fabricate luminescent nanocomposite films. This study assessed the impact of varying Sm^{3+} concentrations on the films'structural, morphological, thermal, and luminescent behaviour. XRD confirmed the orthorhombic crystalline structure of PCL and the cubic spinel structure of $ZnAl_2O_4$. SEM analysis revealed that neat PCL exhibited a porous morphology with spherical-like features, while the addition of nanoparticles led to aggregation and reduced porosity. The degree of crystallinity (Xc) of the coatings increased compared to pure PCL, with PCL/$ZnAl_2O_4$:1.0% Sm^{3+} showing the highest crystallinity. Thermal analysis indicated that the nanocomposites had lower stability than neat PCL, with PCL/$ZnAl_2O_4$ exhibiting the poorest thermal stability. Importantly, photoluminescence studies demonstrated that the incorporation of Sm^{3+}-doped $ZnAl_2O_4$ significantly enhanced emission intensity and induced a colour shift from white to the blue region. These results highlight the potential of these nanocomposite films as promising candidates for luminescent coating applications, where colour tunability and emission enhancement are desirable.

Author: Ms KHAMBULE, Samkelisiwe (University of the Free State-Qwaqwa Campus)

Co-authors: Prof. KOAO, Lehlohonolo (University of the Free State-Qwaqwa Campus); Dr MALIMABE, Moipone (University of the Free State-Qwaqwa Campus)

Presenter: Ms KHAMBULE, Samkelisiwe (University of the Free State-Qwaqwa Campus)

Session Classification: Poster session & Welcome drinks

Track Classification: Condensed Matter Physics