

# Tuneable Luminescence in Multicolour Films: Selective Sensitization of Rare Earth $\beta$ -Diketonate Complexes Doped PMMA Films

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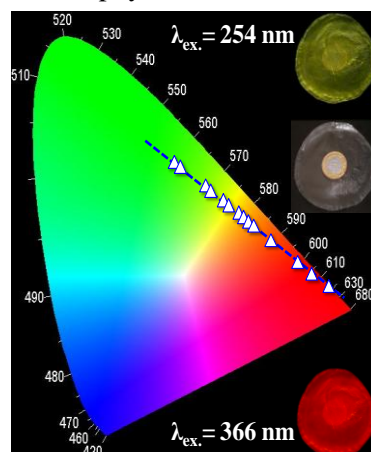
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Trivalent Rare Earth ( $\text{RE}^{3+}$ )  $\beta$ -diketonate complexes and polymethylmetacrylate (PMMA) have been widely employed in the productions of luminescent materials. In this work, preparation, characterization and photoluminescence studies for a series of stand-free polymer thin films incorporating  $\text{RE}^{3+}$ - $\beta$ -diketonate complexes into PMMA were reported. The PMMA matrix not only immobilizes the luminescent  $\text{RE}^{3+}$  species *via* physical and chemical interactions, but also operates as co-sensitizer and enhances the characteristic monochromatic emissions arising from the 4f–4f intraconfigurational transitions of the  $\text{RE}^{3+}$  ions. Furthermore, it was observed colour-tuneable luminescence with the polymeric systems. Therefore, they are potentially attractive for the production of advanced photonic applications such as multicolour anti-falsification optical markers, full range UV sensors etc. Moreover, the observation of intermolecular energy transfer from the emitter level ( $^5\text{D}_4$ ) of  $\text{Tb}^{3+}$  ions to the triplet state ( $T_1$ ) of the  $\text{Eu}^{3+}$  species was unprecedented in literature.



**Keywords:**  $\beta$ -Diketonate Ligands, Energy Transfer, Luminescence, PMMA, Rare Earths

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Project supported by: CAPES, CNPq, FAPESP, inctINAMI and RENAMI.