

Photoluminescent properties of the polyamide /Eu³⁺ β-diketonate complex for optical application

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The Eu³⁺ complex precursor, the polymeric (PA) optical marker and the plastic luminescent films obtained were characterized by infrared spectroscopy (FTIR), X-Ray diffractometry (DRX), emission spectroscopy, and thermogravimetry (TGA). The emission spectra of the Eu³⁺-tta complex doped in the PA exhibited the characteristic bands arising from the ⁵D₀ → ⁷F_J transitions (J = 0-4). High values of the Ω₂ intensity parameter were obtained, indicating the hypersensitive character of the ⁵D₀ → ⁷F₂ transitions and the Eu³⁺ ions are in a polarizable chemical environment. The high values of the Ω₄ parameter confirm the basicity of the oxygen donor from the polymer. Lifetime measurement suggests that doped Eu³⁺ ion has higher luminescence efficiency in the film than hydrated complex. The emission quantum efficiencies (η) and the highest value are observed in the system PA:[Eu(tta)₃(H₂O)₂] 5%. The PA-optical marker resulted a luminescent plastic film, with high stability when processing.

References

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