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Study on the photochemical preparation of Nickel gallium oxide spinel doped with Eu(III) ions from carboxylate and β-diketonate complexes and the evaluation of its optical properties

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In this work, Ni(II) carboxylate and Ga(III) β-diketonate complexes, were studied as precursors for the photochemical deposition of ternary metal oxide thin films with different levels of Eu(III) doping. Diluted solutions of these complexes were mixed, spin-coated on silicon(100) and irradiated at room temperature with a 254 nm UV light. Subsequently, the photodeposited films were annealed at 350, 650 and 950 °C. The photochemistry and annealing of these films was monitored by **Fourier transform infrared spectroscopy**. The obtained samples were characterized by **X-ray diffraction**, **X-ray photoelectron spectroscopy**, **scanning electron microscopy** and UV-vis spectroscopy. The results showed the formation of spinel-type structures ($NiGa_2O_4$). The prepared phosphors under UV irradiation revealed red luminescence, which was attributed to transitions from the $^5D_0$ excited state to the ^7F_j ground states of the Eu^{3+} ions. The intensity of the photoluminescence decreases upon Eu doping, and the performance of these emissions depends strongly on the surface structure and morphology of the photodeposited films.

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