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Bright Red Luminescence under Sunlight of PMMA Polymers doped with Tetrakis Eu^{3+} β-diketonate Complex containing Benzimidazolium Counterion

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In the last decades, Ln^{3+}-based luminescent materials has been widely used in different areas such as optical markers, hybrid materials, luminescent solar concentrators (LSCs) [1]. β-diketonate Ln^{3+} complexes have found wide applications, mainly with the Eu^{3+} ion due to their usually high molar absorptions and suitable T_1 state position for an efficient Eu^{3+} sensitization [2]. PMMA polymer is one of the most widely used mainly due to its excellent mechanical and optical properties besides high light transmittance, chemical resistance, and low optical absorption. Thus, this work investigated the synthesis, full characterization and spectroscopic features of the benzimidazole tetrakis(2-thenoyltrifluoroacetonato)europate(III) complex, $Bzim[Ln(tta)_4]H_2O$. Additionally, the Eu^{3+}- complex was incorporated into PMMA polymeric films in 1, 5, and 10% (w/w) and showed intense red emission arising from the $^5D_0 \rightarrow {}^7F_2$ transition of Eu^{3+} ion under excitation at 254, 310, and 405 nm, as well as, when exposed to sunlight irradiation, suggesting the possible application of these materials as light-converting molecular devices (LCMDs).

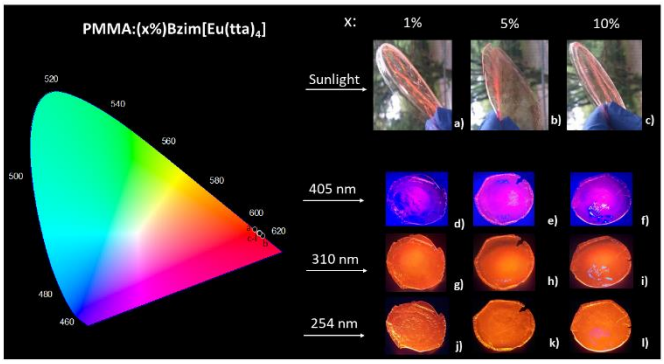

Figure 1. CIE diagram for the doped PMMA:(x%)$Bzim[Eu(tta)_4]H_2O$ films (x: 1, 5 and 10) obtained from their emission spectra at 254, 310, 405 nm, and under sunlight exposure. The inset digital photographs exhibit their emission colors under different excitation wavelengths.

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References

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