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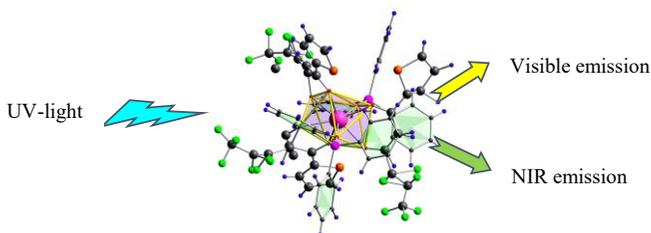
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UV-light Sensitive Visible and Near-Infra Red Emitting Lanthanide tris(β -diketonate) Complexes and their Optoelectronic Applications

Zubair Ahmed, Andrea Barbieri

Institute of Organic Synthesis and Photoreactivity (ISOF), National Research Council of Italy (CNR), Bologna, Italy (Tel: +39 051 6399933; Fax: +39 051 6399844)

UV-light sensitive visible- and near-infrared (NIR)- luminescent lanthanide (Ln) complexes are used in an impressive number of applications, such as sensors [1,2], bioassays [3], or OLEDs (organic light-emitting diodes) [4], owing to their peculiar photophysical properties. Such complexes with organic ligands, of high absorption coefficients, show excellent photoluminescence quantum yield (PLQY) and stability. Regarding the strategies to enhance the PLQY, the most common is the suppression of the radiationless deactivation pathways due to the presence of high-frequency oscillators (e.g. –OH, –CH groups) around the Ln centre. Recently, a different approach to maximize the PLQY of Ln(β -DKs) has been proposed (named “Escalate Coordination Anisotropy”, ECA). It is based on the assumption that coordinating the Ln ion with different ligands will break the centrosymmetry of the molecule leading to less forbidden transitions (loosening the constraints of the Laporte rule). Such complexes are very interesting for biomedical applications [1,4]. Literature reports many OLEDs based on such complexes, but with low efficiency and stability. Consequently, there is a need to develop some new Ln complexes with enhanced PLQYs and stabilities to get efficient and stable devices. For this purpose, UV-light sensitized Ln(III) complexes with various fluorinated/non-fluorinated β -diketonates and O/N-donor neutral ligands were synthesized. The complexes were characterized thoroughly and their photophysical properties were studied to select the best ones for the fabrication of stable and efficient OLED. Finally, the OLEDs were fabricated and investigated using these complexes as emitting layers along with other organic layers like NPB (hole-transporting layer), BCP (hole-blocker) and Alq₃ (electron-transporting layer). The devices show strong red (612 nm) and near infra- red (998–1064 nm) electroluminescences corresponding to characteristics transitions of Eu(III), Yb (III) and Nd(III) ions.



- 1) J.-C. G. Bunzli, Chem. Rev. “Lanthanide Luminescence for Biomedical Analyses and Imaging,” 2010, 110, 2729.