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**Programme and**  
**Book of Abstracts**

## SYNTHESIS AND PHOTOLUMINESCENCE STUDY OF TRINUCLEAR $\text{Eu}^{3+}$ - $\beta$ -DIKETONATE COMPLEX AND AMINE

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Trivalent rare earth ( $\text{RE}^{3+}$ ) coordination chemistry has established increasing consideration in the few past decades due to the characteristic magnetic and photophysical properties of their compounds. Actually, research on the  $\text{RE}^{3+}$  complexes has dedicated on their potential uses in biomedical applications, taking advantage of their photonic properties<sup>1</sup>. In this work, a novel luminescent tris[2-(2-theonyltrifluoroacetone)ethyl] amine: trinuclear  $\text{Eu}(\text{III})$ - $\beta$ -diketonate complex was successfully synthesized. This complex was characterized by X-ray diffraction and infrared spectroscopy (FTIR), proton and carbon magnetic resonance (<sup>1</sup>H-NMR and <sup>13</sup>C-NMR), scanning electron microscopy (SEM). Besides, the thermal behavior of the complex was investigated by thermogravimetric analysis (TG). The photoluminescence properties were determined based on the emission and excitation spectra of the  $\text{Eu}^{3+}$  complex. The emission spectrum show characteristic emission bands, which are assigned to the transitions:  $^5\text{D}_0 \rightarrow ^7\text{F}_0$  (~579 nm),  $^5\text{D}_0 \rightarrow ^7\text{F}_1$  (~596 nm),  $^5\text{D}_0 \rightarrow ^7\text{F}_2$  (~612 nm),  $^5\text{D}_0 \rightarrow ^7\text{F}_3$  (~651 nm),  $^5\text{D}_0 \rightarrow ^7\text{F}_4$  (~706.7 nm)  $^5\text{D}_0 \rightarrow ^7\text{F}_5$  (~753 nm) and  $^5\text{D}_0 \rightarrow ^7\text{F}_6$  (~816 nm) with the  $^5\text{D}_0 \rightarrow ^7\text{F}_2$  transition at ~612 nm being the dominant emission (Fig.1). The absence of the broad emission band from the triplet states ( $T_1$ ) of the organic ligands in the spectral range from 450 to 550 nm is also consistent with an efficient ligand-to-europium intramolecular energy transfer in the complex. The presence of only one peak in the  $^5\text{D}_0 \rightarrow ^7\text{F}_0$  transition indicates the degree of  $C_{nv}$ ,  $C_n$ , and  $C_s$  symmetries in the local chemical environment of the  $\text{Eu}^{3+}$  ions. The experimental intensity parameters ( $\Omega_2$ ), lifetimes ( $\tau$ ), radiative (Arad) and non-radiative (Anrad) decay rates were determined and discussed.

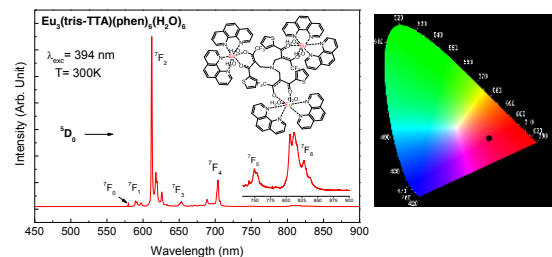


Figure 1. Emission spectrum (left) and CIE chromaticity diagram (right) of  $[\text{Eu}_3(\text{tris-TTA})(\text{phen})_6(\text{H}_2\text{O})_6]$  complex, showing the x, y emission color coordinates (left) and magnified  $^5\text{D}_0 \rightarrow ^7\text{F}_{5,6}$  transitions.

### Reference

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## Lanthanoid $\beta$ -Triketonates: A Remarkable Platform for Optical Materials

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**\*Poster or Oral Presentation\***. In recent times there has been significant interest in the development of luminescent metal complexes in the visible spectral range for the fabrication of organic light emitting devices (OLEDs).<sup>1</sup> In contrast, research into near infrared emitting devices (NIR-OLEDs) has received comparably less attention. Interest in this area has surged recently due to potential applications in technologically relevant fields such as night vision technologies as well as medicinal diagnostics and therapies. We have been interested in the study of luminescent complexes of the lanthanoid elements and their associated OLEDs in the visible region.<sup>2,3</sup> More recently, we have turned our attention into an unexplored ligand system based on  $\beta$ -triketonate ligands. Despite the fact that  $\beta$ -diketonate ligands have been widely used in lanthanoid chemistry, the extension into  $\beta$ -triketonate has received very little attention. Remarkably, reaction of  $\beta$ -triketonate ligands with trivalent lanthanoid cations in the presence of alkali metals resulted in the formation of structurally unique  $\text{Ln}^{3+}/\text{Ac}^+$  ( $\text{Ac}^+ = \text{Na}, \text{K}, \text{Rb}$ ) tetranuclear assemblies. The photophysical properties of the assemblies were assessed, revealing bright visible and NIR emission with respect to lanthanoid complexes bearing  $\beta$ -diketonate ligands, even those which are perfluorinated to minimise quenching. We were also able to demonstrate that these new systems are suitable as precursors for the fabrication of NIR-OLEDs.

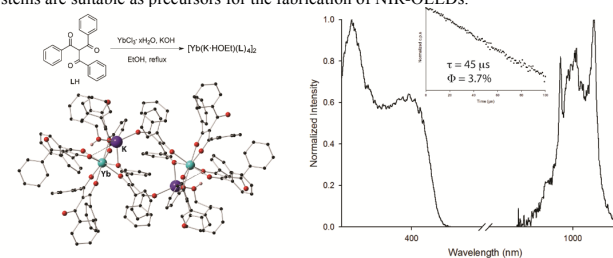


Figure 1. Synthetic pathway of  $\text{Yb}^{3+}/\text{K}^+$  tetranuclear assembly (left), excitation/emission spectra of the assembly (right) with decay (inset).

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