Novel Lanthanide-Based Luminescent Probes for Biological and Lighting Applications

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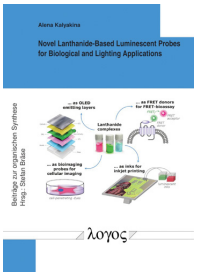

DESCRIPTION:

Lanthanide (Ln) coordination compounds' fascinating optical properties give them tremendous potential in biological and light applications. The following work is devoted to the investigation of different strategies to improve the functional properties of various Ln-based compounds. The first strategy applies a novel approach to ligand fluorination in order to improve the luminescence, solubility and stability of Ln benzoates, allowing their use as luminescent inks, bioimaging probes and emitting layers for organic light-emitting diodes (OLEDs). We designed near infrared-emitting Ln complexes with a bulky anthracene-based ligand. In complex with this ligand, Yb showed excellent performance as an emissive material in host-free near infrared-emitting OLEDs. In pursuit of highly effective FRET donors for FRET bioassays, a Tb complex with an octadentate macrocyclic ligand exhibiting incredibly high luminescence intensity in aqueous buffers was synthesized. The synthetic route to obtain this compound was optimized and a procedure for linker incorporation was proposed. Furthermore, functionalized Ln complexes were modified and conjugated with molecular transporters (peptoids). To increase the coordination ability of Eu(III) ions, cyclic peptoids were used as chelating macrocycles. With both highly luminescent and cell-penetrating properties, such compounds have various potential applications in targeted luminescence.

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