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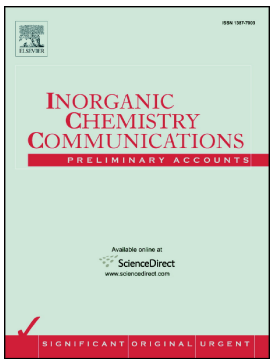

Crystal structure and temperature dependence of the photophysical properties of the [Eu(tta)3(pyphen)] complex

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Crystal structure and temperature dependence of the photophysical properties of the [Eu(tta)$_3$(pyphen)] complex.

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Abstract

In this work, we synthesized the {tris(thenoyltrifluoroacetone)pyrazino[2,3-f][1,10]phenanthroline}europium(III) complex and studied its thermal emission quenching. The crystal structure of the [Eu(tta)$_3$(pyphen)] complex show that the europium(III) ion occupies a distorted D_4d symmetry of a square antiprism site. The complex shows an absolute emission quantum yield of 31%. The temperature dependence of the photophysical properties of the complex was evaluated and indicates that the complex has potential to be applied as a lifetime based luminescent thermometer. The quenching of the luminescence as a function of temperature occurs due the energy back-transfer from the emitter state to the ligand centered triplet state. The temperature induced blue-shift in the $^5D_0 \rightarrow {}^7F_0$ transition band indicates the presence of the electron-phonon coupling in this complex.

Keywords: Europium(III) complex, Luminescent thermometer, Crystal structure, Electron-phonon coupling.