Área: INO

Photoluminescent and magnetic properties of Coordination polymer of Ln(III)-oxamate (Ln = Dy^{3+}, Gd^{3+}, Tb^{3+}, and Eu^{3+})

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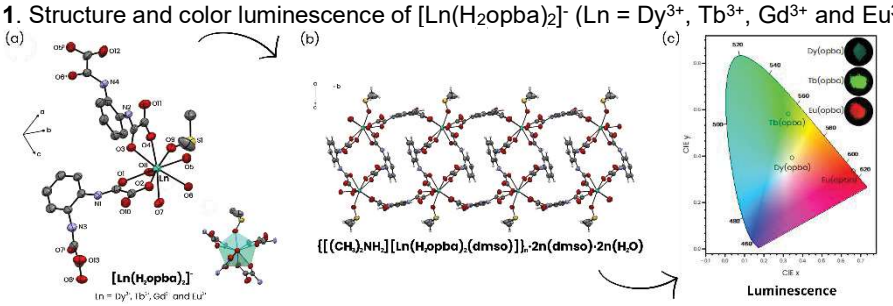
Highlights

Novel series of CP Ln(III)-oxamate. Oxamate can sensitize the lanthanide(III) luminescence in the visible and X-ray region. Dy, Tb, and Gd complexes showed slow field-induced relaxation in AC measurements.

Resumo/Abstract

Lanthanide complexes have interesting optical properties due the *4f* valence eletrons from lanthanide.[1] These optical properties present a high rate of conversion of the absorbed energy into emitted energy when inserted in an adequate coordination environment.[2] Herein, we report a joint magnetic-optical-structural study for the one novel series of lanthanide(III) complexes of general formula $\{[(CH_3)_2NH_2][Ln(H_2opba)_2(dmso)]\}n\cdot 2n(dmso)\cdot 2n(H_2O)$ in which opba = o-phenylenebis(oxamate) and Ln = Dy^{3+}, Tb^{3+}, Gd^{3+}, and Eu^{3+}. The crystal structure determined by single-crystal X-ray diffraction shown polymeric compounds with each lanthanide(III) cation in a capped square antiprism symmetry nine-coordinate environment (LnO_9) (Fig. 1a-b). Solid-state photophysical measurements for the Tb^{3+}, and Eu^{3+} reveal that oxamate ligands can sensitize the lanthanide(III) luminescence in the visible region, through an energy transfer process ("antenna effect") (Fig. 1c). Furthermore, XEOL measurements revealed that luminescence is the main response to X-ray excitation. In other words, one can apply the complexes to detect radiation at different wavelengths without observing the degradation of the samples under the measured conditions. The overall quantum yields of the Terbium (9.3%) and Europium (21.1%) complexes were the highest reported in the literature for complexes with oxamate-type ligands. Cryomagnetic measurements in dynamic current (ac) regimes showed slow field-induced relaxation in the Dy, Tb, and Gd complexes.

Figure 1. Structure and color luminescence of $[Ln(H_2opba)_2]^-$ (Ln = Dy^{3+}, Tb^{3+}, Gd^{3+} and Eu^{3+}) complexes



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