

Área: INO

Lanthanide coordination polymers containing *N*-phthaloylglycinate and terephthalate ligands: Synthesis, structure and optical properties.

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Highlights

- The lanthanide mixed carboxylate coordination polymers were prepared.
- Structural and photoluminescent properties were investigated.

Abstract

Novel lanthanide coordination polymers of general formula $\{[\text{Ln}_2(\text{phthgly})_4(1,4-\text{dbc})(\text{H}_2\text{O})_6](\text{H}_2\text{O})_4\}_{\infty}$, Eu-(1) and Gd-(2) for Ln: Eu and Gd, respectively; where phthgly: *N*-phthaloylglycinate and 1,4-dbc: terephthalate, were synthesized by the reaction between an aqueous solution of $\text{Ln}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$ and a mixed of phthgly and 1,4-dbc carboxylate ligands. These compounds were characterized by elemental analysis, infrared spectroscopy, and thermogravimetric analysis (TGA). The results of single-crystal X-ray diffraction reveal that these coordination polymers are isostructural, crystallizing in the triclinic space group $P\bar{1}$. The molecular structures of Eu-(1) and Gd-(2) (Fig. 1a) are formed by polymeric chains of symmetric binuclear units bridged by 1,4-dbc ligand. Surprisingly, all ligands participate in hydrogen bonding interactions, creating a highly rigid crystalline structures (Fig. 1b). Furthermore, the carboxylate groups adopt different coordination modes (bidentate chelate, bidentate bridging)^[1,2]. TGA/DrTGA analyses show two consecutive weight loss events from 55 to 123 °C attributed to the releasing of lattice and coordination water molecules, respectively. In addition, several consecutive thermal events above 350 °C may be assigned to the thermal decomposition of the anhydrous materials. The luminescence data indicated that the Eu^{3+} ion exhibits high luminescence intensity with high color purity under direct excitation or via intramolecular energy transfer from ligands (Fig. 1b). The color coordinates (Fig. 1c) of the Eu(1) compound depict reddish emission. These novel coordination polymers offer a more attractive platform for developing functional materials for different applications.

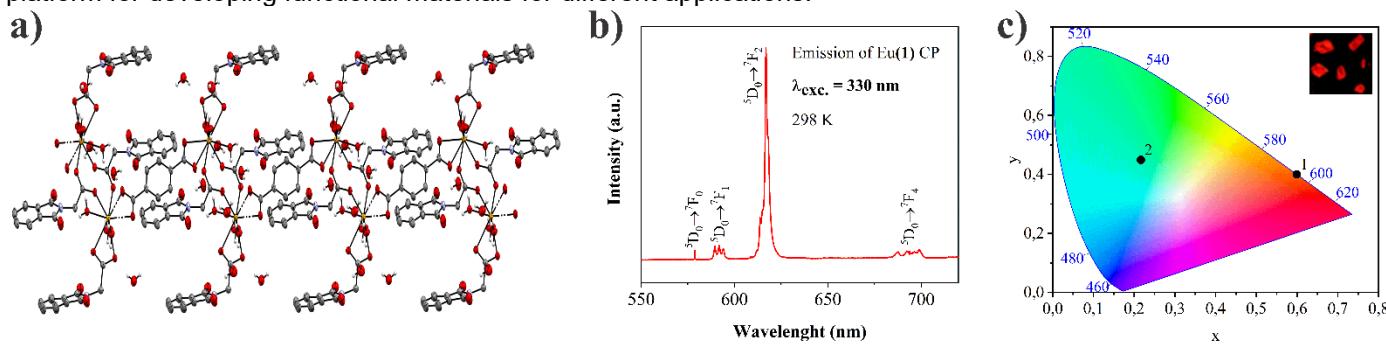


Figure 1. (a) Packing along \mathbf{a} axis of coordination polymer 1; (b) Emission spectrum of complex 1 under excitation at 330 nm and (c) CIE color coordinates of complex 1 and 2. Inserted a photo of complex 1 upon excitation at 330 nm.

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