

Lanthanide coordination polymers containing *N*-phthaloylglicinate 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 $\{[Ln_2(phthgly)_4(1,4-dbc)(H_2O)_6](H_2O)_4\}_\infty$, 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 $Ln(NO_3)_3 \cdot 5H_2O$ 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.

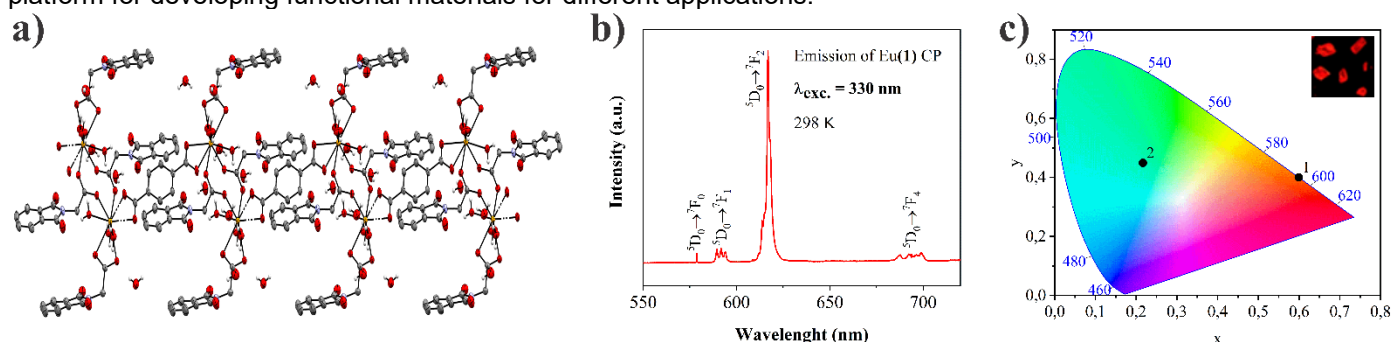


Figure 1. (a) Packing along *a* axis of coordination polymer **1**; (b) Emission spectrum of complex **1** under excitation at 330 nm and (c) CIE color coordinates of complex **1** and **2**. Inserted a photo of complex **1** upon excitation at 330 nm.

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