

One Novel Red-luminescent Coordination Polymer of Eu-*p*-benzenedicarboxylate with Nitrogen-donor-containing Lewis Base

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Abstract: The crystal structure of novel coordination polymer with excellent characteristic luminescence of Eu³⁺, the three-dimensional network of {Eu₂(*p*-BDC)₃(Phen)₂(H₂O)₂}_n is presented.

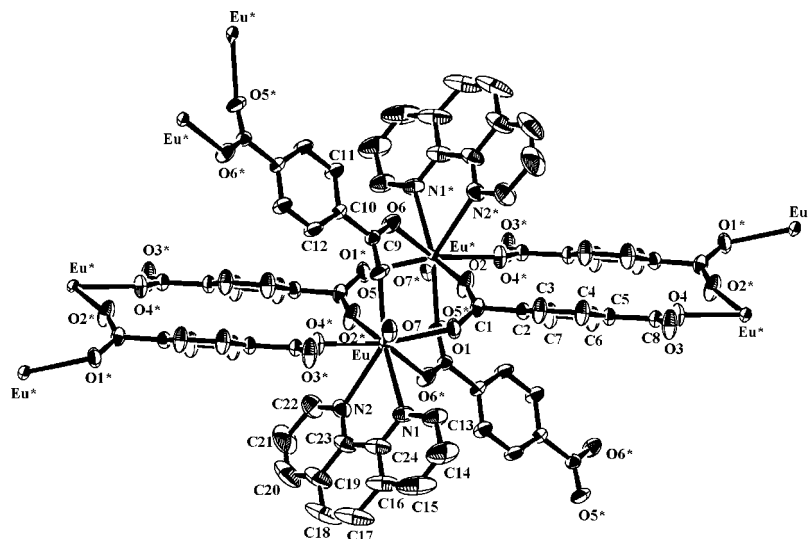
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Benzenedicarboxylic acid (H₂BDC) has constructed many extended structures¹, including the late interesting three-dimensional networks of lanthanide-BDC^{1a, b}. To our knowledge there are only two examples of lanthanide-BDC coordination polymer structurally characterized. Here we present the crystal structure of Eu³⁺ coordination polymer, {Eu₂(*p*-BDC)₃(Phen)₂(H₂O)₂}_n (*p*-BDC=1,4-benzenedicarboxylate) obtained in agar medium, with intense red-luminescence under UV radiation. It is the first time to create such architectures for lanthanides and BDC by means of soft chemistry synthesis.

In {Eu₂(*p*-BDC)₃(Phen)₂(H₂O)₂}_n (see **Figure 1**), each Eu³⁺ ion is eight-coordinated by five oxygens of *p*-BDC anions in monodentate fashion, one water ligand and two nitrogens of Phen in chelating fashion, respectively, resulting in a square antiprism coordination polyhedron. The Eu atom and its central-symmetric atom Eu* are linked by four bridges forming the binuclear unit and the stereo-multicyclic structure². When one carboxylate works as bridge and another carboxylate (with O3 and O4) at the other terminal of one μ₃-*p*-BDC anion approaches to the europium atom that belongs to adjacent unit-cell, only O4 atom bonds with the Eu atom as the existence of Phen, and O3 forms hydrogen bond with the H atom of water from adjacent symmetric unit. When the carboxylate of one type BDC anion (*e.g.* O4 atom of μ₃-*p*-BDC) integrates the binuclear coordination units into one dimensional chain, the carboxylate of another type BDC anion (*e.g.* μ₄-*p*-BDC) polymerizes the one dimensional chains into two dimensional layer structure. The hydrogen bond between layers fabricates the structure further into three dimensional network.

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Figure 1 Extended molecular structure of the coordination polymer (hydrogen atoms omitted for clarity)



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References and Note

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- Crystallographic parameters have been deposited in the editorial office of CCL.

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