Synthesis and Photophysical Properties of Yb(III) Coordination Polymer with Phosphine Oxides Having Porphyrin Moiety

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Near-infrared (NIR) luminophores have attracted attention for bioimaging applications due to their high biopermeability. Yb(III) luminophores exhibit characteristic NIR emission based on 4*f*-4*f* transition. Yb(III) complexes with porphyrin photosensitizers have been reported as a NIR luminescent materials.[1] The strong NIR emission of Yb(III) complexes and coordination polymers with hexafluoroacetylacetonato (hfa) and phosphine oxide ligands have also been reported.[2,3] Here, we report synthesis and photophysical properties of novel Yb(III) coordination polymer composed of $Yb(hfa)_3$ and phosphine oxide linker ligands with porphyrin π-skeleton.

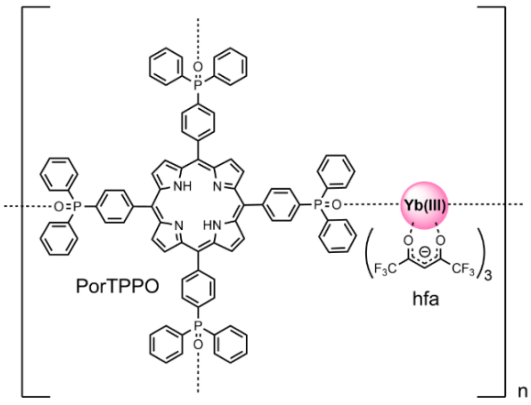

Figure 1. Molecular structure of Yb(III) coordination polymer $[(Yb(hfa)_3)_2(PorTPPO)]_n$.

The porphyrin ligand (PorTPPO) was synthesized from 4-bromobenzaldehyde via five step reactions. The novel Yb(III) porphyrin coordination polymer $[(Yb(hfa)_3)_2(PorTPPO)]_n$ was synthesized by mixing PorTPPO ligand and $Yb(hfa)_3{\cdot}2H_2O$ in CH_2Cl_2 and MeOH solution (vol/vol = 1/1) (Figure 1). The resulting Yb(III) coordination polymer was characterized by ESI-MS, XRD and IR measurements. Prepared $[(Yb(hfa)_3)_2(PorTPPO)]_n$ showed absorption bands of hfa and PorTPPO Soret band at 312 and 415 nm, respectively. The NIR emission of $[(Yb(hfa)_3)_2(PorTPPO)]_n$ excited at 415 nm (Soret band) was observed at around 1000 nm. These results indicate that the porphyrin units show effective photosensitization for NIR emission in a Yb(III) coordination polymer.

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