

Synthesis and photochemical properties of cerium(III) coordination polymer with pentafluorobenzoate

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Recently, inorganic Ce(III) compounds have attracted attention for use as luminescent and photocatalytic materials based on the 4f orbitals [1-3]. In contrast, photo-functional properties of Ce(III) complexes with π -conjugated ligands have rarely been reported. In this study, our electronic structure calculation of Ce(hfa)₃(TPPO)₂ (hfa: hexafluoroacetylacetonate, TPPO: triphenylphosphine oxide) revealed that the energy level of metal-to-ligand charge transfer (MLCT) is higher than that of ligand π - π^* (S₁) states, suggesting that the MLCT excited state is quenched by the S₁ and T₁ states. Thus, we synthesized Ce(III) coordination polymers (Ce-PFBA: Fig. 1) using strong acceptor-type ligand (PFBA: pentafluorobenzoate) and evaluated its photophysical and photochemical properties based on the MLCT transition. We also prepared La(III) coordination polymer (La-PFBA) as a reference.

The diffuse reflectance spectra of the Ln-PFBA (Ln = Ce, La) are shown in Fig. 2. The characteristic MLCT band was observed at around 330 nm for the Ce-PFBA. From the emission measurement of the Ce-PFBA, MLCT emission band was observed at around 430 nm, suggesting the formation of stable MLCT excited state. We also found the fenton-like reaction using Ce-PFBA.

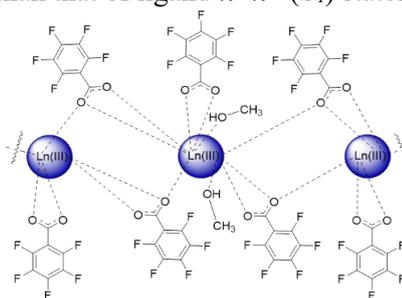


Fig. 1 Ln-PFBA (Ln = Ce, La).

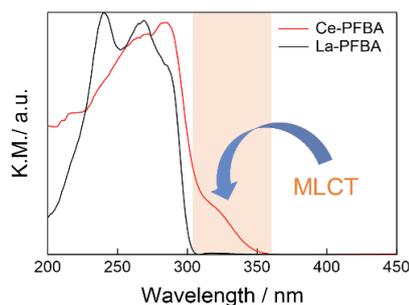


Fig. 2 Diffuse reflectance spectra.

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