

Surface Attachment and Circularly Polarized Luminescence of Luminous Terbium Complex on Silica Surface with Chiral Ligands

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Chiral metal complexes immobilized on solid surfaces are investigated for applications to solid chiral sensors, heterogeneous asymmetric catalysts etc. We investigated a new preparation method of surface-attached chiral metal complexes via chirality induction of metal complexes on a solid surface modified with chiral ligands. The induction of the chirality of an achiral terbium (Tb) complex (**1**_{Tb})¹ was investigated on a silica (SiO₂) modified with chiral benzyl alcohol ligands (Figure 1).

SiO₂ surface was modified with newly-prepared chiral benzyl alcohol ligands (**L(R/S)**) and SiO₂ attaching the chiral ligands (**L(R/S)/SiO₂**) was prepared. UV-vis and FT-IR suggested that the structure of **L(R/S)** was maintained on the SiO₂ surface. The solid-state CD of **L(R/S)/SiO₂** showed inversed peaks at 230 nm (Figure 2(A)), which was similar to the solution-state CD of **L(R/S)**, suggesting that the chirality of **L(R/S)** was retained on the SiO₂ surface.

1_{Tb} was attached to **L(R/S)/SiO₂** by the impregnation method (**1**_{Tb}/**L(R/S)/SiO₂**). The DR UV-vis of **1**_{Tb}/**L(R/S)/SiO₂** showed absorption peak at around 301 nm (Figure 2(B)), which was similar to the solution-state UV-vis of **1**_{Tb}, suggesting that the structure of **1**_{Tb} was kept on the SiO₂ surface. The solid-state CPL of **1**_{Tb}/**L(R/S)/SiO₂** showed inversed CPL peaks around 550 nm, which suggested that the chirality of **1**_{Tb} was actually induced by the coordination of **1**_{Tb} to **L(R/S)/SiO₂**. The CPL peak intensities of **1**_{Tb}/**L(R/S)/SiO₂** were obviously larger than that of **1**_{Tb}/(R/S)-1-phenylethanol in acetonitrile solution. These results strongly indicated that the unique CPL property of **1**_{Tb} was induced at the SiO₂ surface by the coordination to the surface-functionalized chiral ligands.

1) H. Nakai, *et al.*, *Chem. Commun.*, **2014**, 50, 15737-15739.

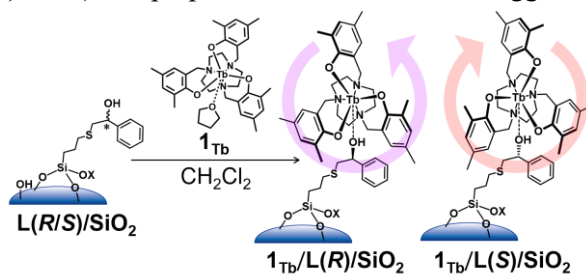


Figure 1. Chirality induction of **1**_{Tb} with **L(R/S)/SiO₂**.

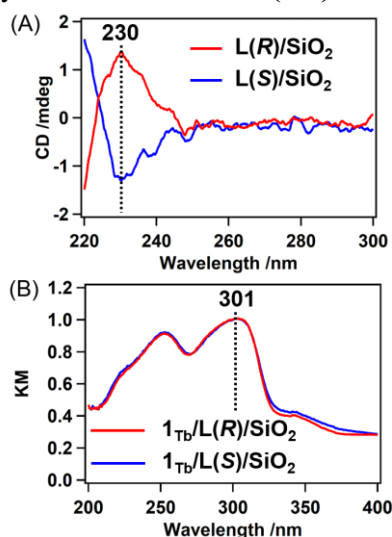


Figure 2. (A) Solid-state CD spectra of **L(R/S)/SiO₂**. (B) DR UV-vis spectra of **1**_{Tb}/**L(R/S)/SiO₂**.