Europium (III)-based nanotubular assemblies with photooxidative ability

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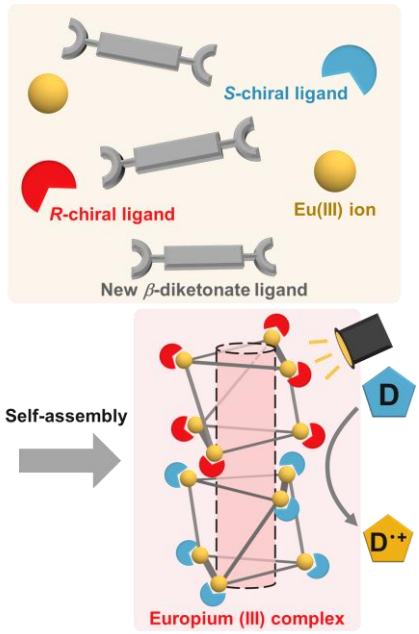
Nanotube with one dimensional porous cavity is an attractive material for material transport and scaffolds of catalytic reactions, but rational construction of one-dimensional nanoporous structures remain difficult. Among the synthetic nanoporous structures, one dimensional metal-organic frameworks (1D MOFs) and stacked macrocyclic assemblies are the most accessible materials. However, the synthetic nanoporous structures reported so far have fixed coordinate bond angles or fixed angularity of covalent bonds, making it difficult to create smooth concentric one-dimensional cavities. In contrast, nanotube structures in natural, such as tobacco mosaic virus, form smooth, concentric, one-dimensional cavities by stacking proteins at periodic angles[(1)]. In this work, we synthesized Europium (III) complex having smooth concentric one-dimensional cavities and studied photooxidative ability of it (**Scheme 1**).

We synthesized new *β*-diketonate ligand, and Europium (III) complex using it and chiral ligands. In result of X-ray diffraction of Europium (III) complex crystal, it constructed nanotube structure having smooth concentric one-dimensional cavities (**Figure 1a, b**). Next, we irradiated UV light to pyrrole in Europium (III) complex crystal after crystal sponge. In this result, crystal' yellow was deeper after UV light irradiation (**Figure 1c, d**).



Scheme 1. The concept of this work.

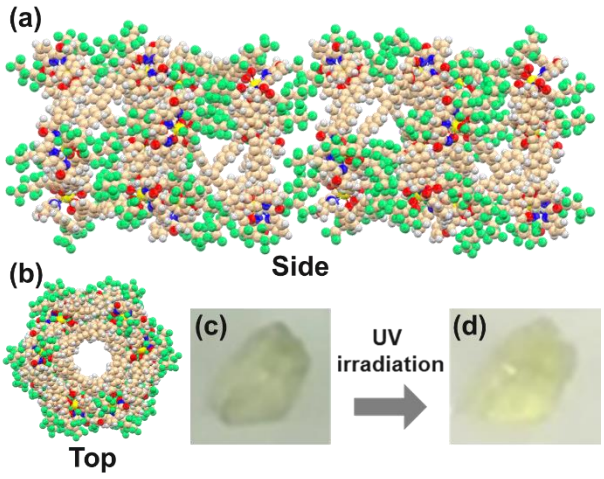


Figure 1. (a, b) Crystal structure of Europium (III) complexes. (c, d) Crystal color of pyrrole in Europium (III) complex before(c) and after (d) UV irradiation.

1) Klug, A. *Philosophical Transactions of the Royal Society of London B.* **1999**, *354*, 531–535.