

キラリティとヘリカルな配位様式を有するユウロピウム錯体の膜化による円偏光発光増強

(¹ 青山学院大理工・² 富山大院理工) ○高垣亮佑¹・岩下竜也²・大曲仁美¹・岩村宗高²・野崎浩一²・長谷川美貴¹

Strong enhancement of circularly polarized luminescence of Eu complexes with chirality and helicity by the film formation. (¹ Graduate School of Science and Engineering, Aoyama Gakuin University¹ Graduate School of Science and Engineering, Toyama University)

○Ryosuke Takagaki,¹ Tatsuya Iwasita,² Hitomi Ohmagari,¹ Munetaka Iwamura², Koichi Nozaki,² and Miki Hasegawa¹

This study aimed to enhance circularly polarized luminescence (CPL) of Eu complexes with chirality and helical properties by the film formation. The S- and R-EuL^{dph} were deposited on the surface modified quartz substrate^[1] by wet deposition method (Fig. 1). The behavior of Eu 3d XPS bands indicates that the complexes form chemical bonds between the scaffold molecules and Eu³⁺ during the film formation. These bands are attributed to the ⁵D₀→⁷F_J (*J* = 0, 1, 2, 3, and 4) transitions of Eu³⁺, respectively. These corresponding bands appear at 579, 591, 615, 648 and 697 nm for the films, respectively. Mapping was attempted by microscopic CPL measurement system^[2] (Fig. 2). The R and S forms were clearly distinguishable in this film. The *g*_{lum} value, which indicates the degree of polarization of the CPL, was found to be about 0.3 for the film. The *g*_{lum} value of the film was about 0.3, which is about the same as that in acetonitrile and about 100 times higher than that of the powder.

Keywords : Lanthanide complex; Luminescence; Layer-by-Layer film

本研究では、キラリティとらせん性を加味した Eu 錯体 EuL^{dph} を用い、その膜化により円偏光発光(CPL)の増強を試みた。S 体と R 体の EuL^{dph} は、表面改質させた石英基板上^[1]に、湿式成膜法により膜化させた(Fig.1)。Eu 3d XPS 帯の挙動から、この錯体は膜形成時に足場の分子と Eu³⁺ が化学結合を形成している。EuL^{dph} の発光帯は固体で 580, 593, 615, 648 および 684 nm に観測され(λ_{ex}=315 nm)、これらは Eu³⁺ の ⁵D₀→⁷F_J (*J* = 0,1,2,3 および 4)遷移にそれぞれ帰属される。これらに対応する帯は、膜の場合それぞれ 579, 591, 615, 648 および 697 nm に現れる。顕微分光法による CPL 測定^[2]により、マッピングを試みた(Fig. 2)。この膜は、R 体と S 体が明瞭に区別できた。この CPL の偏光の度合いを示す *g*_{lum} 値は、膜の場合、0.3 程度の値が認められた。これはアセトニトリル中の場合と同程度で、粉末の約 100 倍に相当する。

[1] N. Marets, M. Hasegawa, *et al*, *ACS Omega.*, **2019**, *4*, 15512–15520.

[2] H. Koike, K. Nozaki, M. Iwamura, *et al*, *Chem. Asian J.*, **2020**, *15*, 85-90.

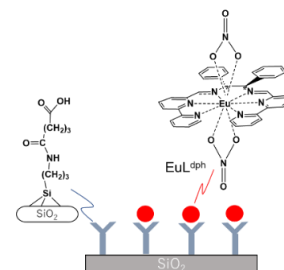


Fig. 1 Schematic representation of LbL film of EuL^{dph} on a quartz substrate.

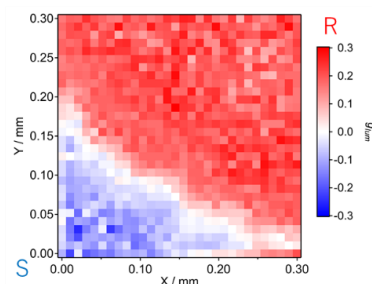


Fig. 2 Microscopic CPL Images for *g*_{lum} spatial dispersions of R-EuL^{dph} and S-EuL^{dph}, monitored at ~590 nm.