エチレンオキシド鎖を導入した棒状金錯体の合成と発光挙動評価

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Synthesis and Luminescence Behavior of Rod-like Gold (I) Complexes with Ethylene Oxide Chains ([1]*Ritsumeikan University*) ○Moe Mizobata[1], Kohsuke Matsumoto[1], Osamu Tsutsumi[1]

In recent years, aggregation-induced emission (AIE) materials, which exhibit strong luminescence in the solid state, have gained significant attention. Among these, gold complexes are known for their unique AIE behavior, attributed to aurophilic interactions that occur when gold atoms approach each other within a certain distance. Previously, we reported that introducing alkyl side chains of appropriate length into gold complexes induces liquid crystallinity, and that varying the chain length alters the liquid crystalline phases and luminescence behavior. Furthermore, we demonstrated that phase transitions can be utilized to control the emission behavior of gold complexes. In this study, we investigated the influence of flexible side chains on the liquid crystalline and luminescent properties of gold complexes by synthesizing a novel gold complex with ethylene oxide chains. These chains, characterized by oxygen-carbon bonds with lower rotational barrier than carbon-carbon bonds, were introduced to achieve liquid crystalline phases at lower temperature ranges (Figure 1). The luminescence behavior of the synthesized complexes in the aggregated state was evaluated, revealing an emission peak at 428 nm (Figure 2). This study highlights the phase transition behavior of the complexes and its impact on luminescence properties.

Keywords: Gold complex, Luminescence, Aggregation-Induced Luminescence

近年，固体状態で強い発光を示す凝集誘起発光（AIE）材料が注目を集めている。なかでも金錯体は，金原子同士が一定距離以内に近づくと親金相互作用と呼ばれる相互作用を発現し，特異的な発光を示すことが知られている。これまでにわれわれは，金錯体に適切な長さのアルキル鎖を導入することで液晶性が発現し，またその鎖長を変化させると発現する液晶相が変化することを報告した。さらに，相転移により金錯体の発光挙動を制御できることも見出した[1)]。

本研究では，柔軟鎖の構造が金錯体の液晶挙動と発光挙動に与える影響を詳細に調べることを目的とし，エチレンオキシド鎖を導入した新規錯体を合成した。炭素—炭素結合よりも柔軟性が高い酸素—炭素結合を有するエチレンオキシド鎖を導入することでより低温領域での液晶相の発現を期待した（Figure 1）。合成した金錯体の凝集相における発光挙動を評価したところ，428 nm に極大発光波長をもつ発光を示すことがわかった（Figure 2）。この錯体の相転移挙動と相転移に伴う発光挙動変化について報告する。

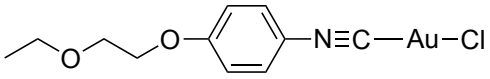

Figure 1. Molecular structure of the synthesized gold complex

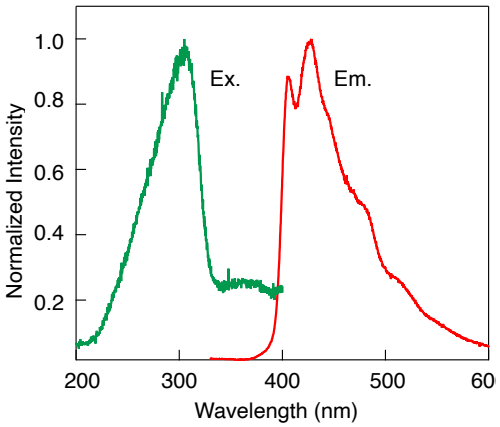

Figure 2. Photoluminescence (λ_{em} = 310 nm, red), and excitation (λ_{em} = 440 nm, green) spectra of the gold complex

1) Fujisawa, K; Tsutsumi, O. *et al*. *J. Mater. Chem. C.* **2014**, *2*, 3549–3555.