

有機塩を用いた超分子的アプローチによる発光性有機半導体分子の配列変換と発光特性

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Transformation of molecular arrangements and photophysical properties of luminescent organic semiconductor molecules by supramolecular approach with organic salts
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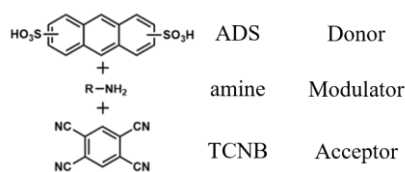
Charge-transfer complexes (CT complexes) exhibit high conductivity or ferroelectricity depending on the combinations of donors and acceptors, and therefore they have been attracting attention as a candidate of promising organic electronic materials. Physical properties of CT complexes depend on the relative positions of donors and acceptors. However, controlling their relative positions without changing their molecular structures is difficult, and the relationship between the physical properties and the relative positions of CT complexes has not been well established. On the other hand, we have utilized the steric factors of amines in organic salts composed of sulfonic acids with functional molecules, and amines, and have reported various molecular assemblies of the functional molecules and their photoluminescence properties.

In the current work, we tried revealing the relationship between the relative positioning and the physical properties, preparing the organic salts composed of anthracenedisulfonic acids (ADS) as donors and alkylamines, and preparing the CT complexes by combining the salts and 1,2,4,5-tetracyanobenzene (TCNB) an acceptor. The relative positioning types changed depending on the introduced position of the sulfo groups, and amines also changed the relative positioning and photoluminescence properties. The relative positioning in 2,6-ADS system was the most diverse.

Keywords : Organic crystals; Charge-transfer complex; Hydrogen bonds; Photoluminescence properties

電荷移動錯体(CT 錯体)は、ドナーとアクセプターの組み合わせにより、高い導電性や強誘電性を示し、有望な有機電子材料として注目されている。CT 錯体の物性はドナーとアクセプター相対配置にも大きく依存するが、分子構造を変えることなく相対配置の制御することは困難であったため、物性と相対配置の関係は十分理解されていない。当研究室ではスルホン酸アミン塩における電荷補助型水素結合とアミンの立体因子を利用し、機能性分子の多様な分子集合の構築とその発光特性について報告してきた。

本研究では、CT 錯体の物性と相対配置の関係を解明するために、ドナーのアントラセンジスルホン酸 (ADS) と種々のアルキルアミンからなる有機塩と、アクセプターの1,2,4,5-テトラシアノベンゼン (TCNB) を用いて CT 錯体を作製した(Scheme 1)。スルホ基の導入位置により相対配置の仕方が変化し、アミンによって相対配置とそれに基づく発光特性が変化した(Figure 1)。2,6-ADS を用いた系が最も多様な相対配置を示した。



Scheme 1. The components of CT complexes.

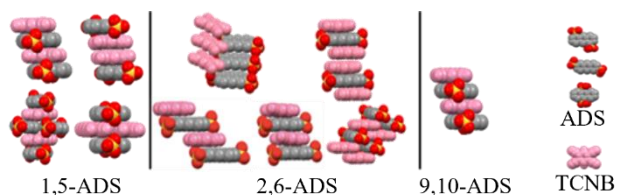


Figure 1. Relative positioning of donor (ADS) and acceptor (TCNB).