Introduction

Scientists learned from natural biological systems for designing organic molecules capable of self-assembling into interesting nano-scale architectures. In this research, we designed and synthesized two organic light-emitting molecules (**Blue Compound** and **Green Compound**) to investigate their self-assembly nano structures (Figure 1).

In addition, the good spectral overlap between **Blue Compound**'s emission and **Green Compound**'s absorption gave us the possibility for studying the energy transfer behaviors between them, and demonstrated interesting application of these emissive organic nano structures.

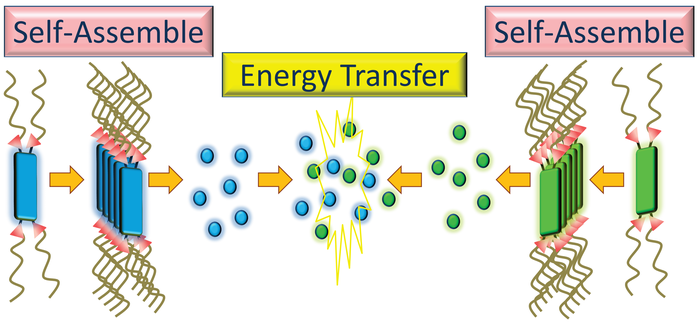


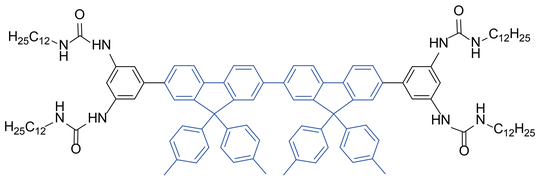
Figure 1. Self-assembly and energy transfer

Objectives

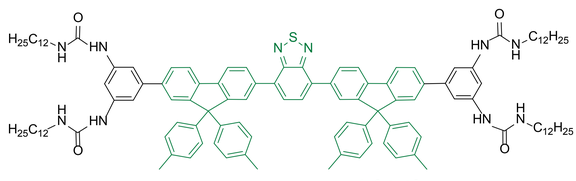
1. To synthesize two organic light-emitting compounds with the capability to self-assemble.
2. To study the energy transfer behavior between the two self-assembled nano structures.

Experiments

1. Molecule Design of Blue and Green compounds



Blue compound (BC)



Green compound (GC)

bis-urea group | rigid blue π-core | bis-urea group

Give intermolecular hydrogen bonds (urea) and van der Waals forces (long hydrocarbon chain) for molecular self-assembly.

bis-urea group | rigid green π-core | bis-urea group

Give intermolecular π-π stacking for self-assembly and light-emitting (fluorescence).

2. Nano Microstructure Characterizations: Scanning Electronic Microscope (SEM, FEI Nova Nano SEM 200), Transmission Electronic Microscope (TEM, Hitachi H-7650) and Dynamic Light Scattering (DLS), High-voltage TEM (Tecnai G2 200kv)

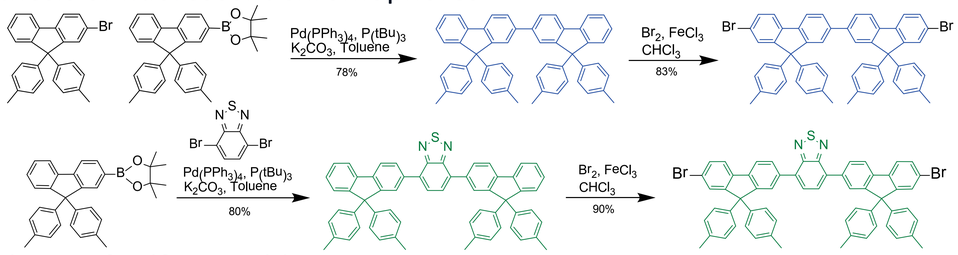
3. Photophysical Properties Measurements: UV-Vis (Jasco V-670), Fluorescence Spectroscopy (Hitachi F4500)

4. Energy Transfer Observation: Laser Scanning Confocal Microscope (LSCM, Leica TCS SP5)

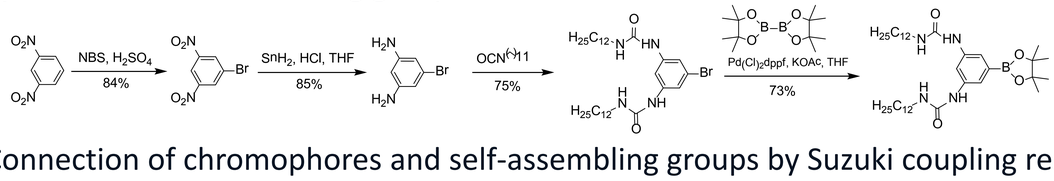
Results and Discussion

1. Synthesis of new compounds BC and GC

1) Synthesis of fluorescent chromophores



2) Synthesis of self-assembling groups



3) Connection of chromophores and self-assembling groups by Suzuki coupling reaction