**Organic Light-Emitting Nano Vesicles Self-Assembled**

**from Bis-Urea Containing Fluorescent Molecules**

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Scientists learned from the natural biology systems for gathering useful information to design organic molecules capable of self-assembling into interesting nano-scale architectures. In this research, we have designed and synthesized two organic light-emitting molecules (Blue and Green) for the characterizations of their self-assembly nano structures and study their interactions at different levels. The desired molecules were configured with rigid π-conjugated cores serving as the emissive chromophores and end-capped with bis-urea groups that can govern the self-assembly behaviors. In addition, the central chromophore structures were selected to obtain a good spectral overlap between blue molecule’s emission and the absorption of green molecule. This molecular design strategy gave us the possibility for studying the energy interplay between them. We used SEM and TEM to characterize the nano structures in various media and found these two molecules can spontaneously form spherical nano structures with the averaged size around 400 nm. The interesting uniform nano-vesicles were formed by subtle intermolecular interactions such as π-π stacking from the planar rigid π cores, hydrogen bonds from the bis-urea groups, and van der Waals forces from the long alkyl side chains. The energy transfers between them were investigated in molecular level and nano scale by fluorescent spectroscopy and confocal microscopy, respectively. We will present the different energy transfer behaviors at various scales and demonstrated interesting applications of these emissive organic nano vesicles.

**含雙尿素螢光分子之自組裝與能量轉移行為研究**

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　　近年來科學家取材自生態系統，設計出具自組裝成奈米微結構能力的有機分子。在本研究中，我們設計並合成出兩種可自組裝成奈米結構的有機螢光分子（藍光及綠光）並探討其不同程度的交互作用。我們的分子是由核心共軛分子結構當作發色團，而雙尿素螢光分子則控制了其自組裝能力。此外，藍色的放光波長與綠色的吸收波長在光譜上有明顯的重疊，因此我們將之選為核心共軛分子結構，使我們能觀察到其能量交互作用。我們使用掃描式以及穿隧式電子顯微鏡來鑑定微結構的特性，並從中發現兩分子可自組裝成平均大小為400奈米左右的球形奈米結構，此規則奈米球形是藉由分子之間由核心共軛分子所產生的π-π雙鍵、雙尿素辨識基團產生的氫鍵及常嘆鏈產生的凡德瓦力所形成。我們還使用螢光光譜儀以及共聚焦雷射顯微鏡來分別觀察其分子級和奈米級的能量轉移行為。未來我們將會探討不同尺度下的能量轉移行為並將此有機螢光分子使用於有趣的應用。