Triplet Energy Migration and Photon Upconversion in Molecular Self-Assemblies

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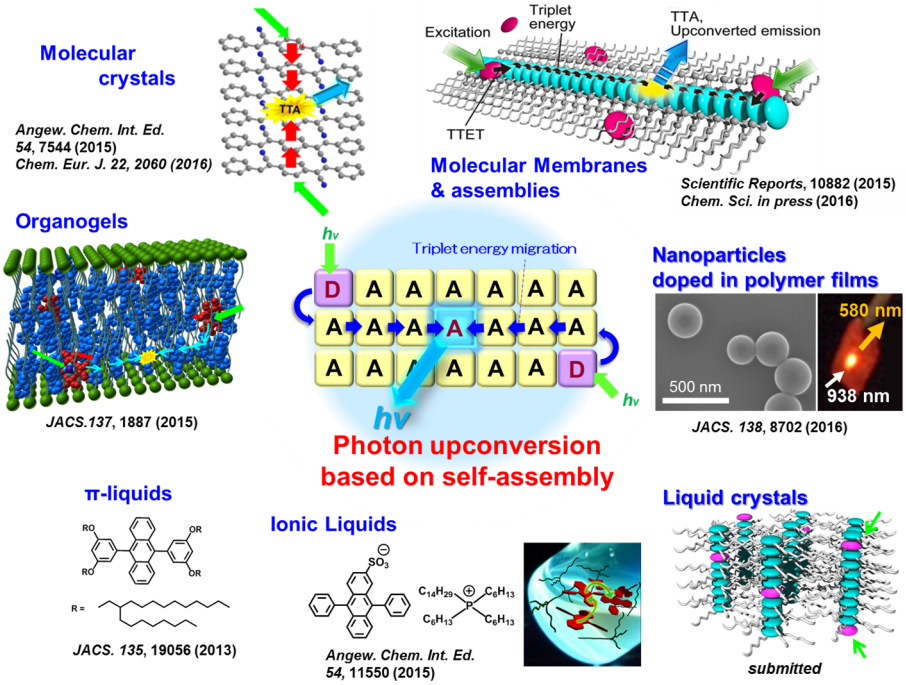
Abstract

Triplet-triplet annihilation-based photon upconversion (TTA-UC) is a promising methodology which can be applied to many sunlight-based energy conversion systems. To date, efficient TTA-UC has been achieved in solution based on the molecular diffusion of excited triplet molecules. However, the diffusion of chromophores in such low-viscosity solvent is not high enough to maximize the UC quantum yield at low solar irradiance. To solve these problems, we introduced the concepts of energy migration in ordered molecular self-assemblies[1] to achieve efficient TTA-UC in molecular systems.[2-10] Interestingly, some of the molecular self-assemblies dispersed in solution or organogels revealed oxygen barrier properties, which allowed TTA-UC even under aerated conditions.[2,3,5,8-10] In this talk, our recent development on the supramolecular TTA-UC in varied molecular systems will be discussed.



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