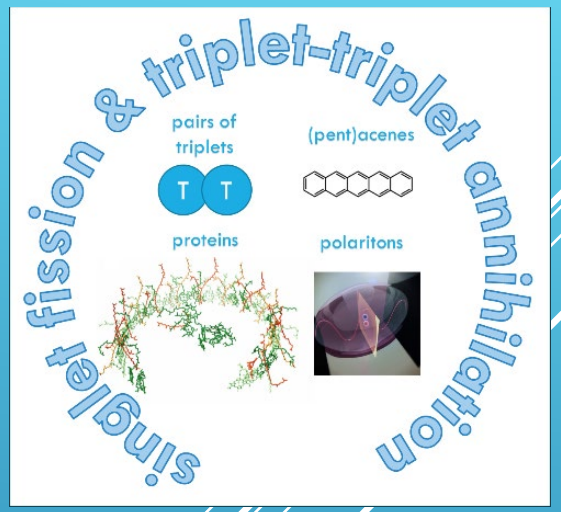
Appl. Chem. Department seminar, The 78th CMS International Seminar

The 11th Excited-state Functional Chemistry Seminar

# Prof. Jenny Clark (website)

The University of Sheffield, UK

## "Two excitons from one photon: pairs of triplets in photosynthesis, (pent)acenes and polaritons."




Date: Nov 9th (Thu) 2023, 16:00~ (JST)
Place: West 4, 2nd floor, Ito Campus

Abstract: Pi-conjugated molecules are ubiquitous: as pigments in nature, they absorb light and shuttle energy between sites to drive photosynthesis or to aid avian navigation. As organic semiconductors, they are the active materials in high-end televisions and flexible solar cells. As emergent quantum technology materials, they demonstrate ambient entangled spin qubits or polariton condensation. They are also tantalisingly complex. From biology to quantum technology, molecular excited-state behaviour is determined by the interplay between photonic, electronic, spin and nuclear degrees of freedom. The coupling between these degrees of freedom is often strong enough that they must be treated on equal footing, non-perturbatively. This poses significant challenges for our understanding, and subsequent technology development. I study these systems using a combination of time-resolved (fs-ms) and steady-state spectroscopic techniques.

I will talk about recent work from my group on understanding the process of singlet exciton fission in pi-conjugated molecules. In singlet exciton fission, the photoexcited singlet (spin-0) exciton spontaneously splits into two triplet (spin-1) excitons. This two-for-one process offers the possibility of beating thermalization losses in solar cells, improving LED efficiency and is even known to occur in photosynthetic complexes. In this talk, I will discuss our recent work on singlet fission and its inverse, triplet-triplet annihilation, in organic semiconductors [1, 2], photosynthetic and synthetic protein complexes [3, 4] and polaritonic microcavities [5].

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Admission: free