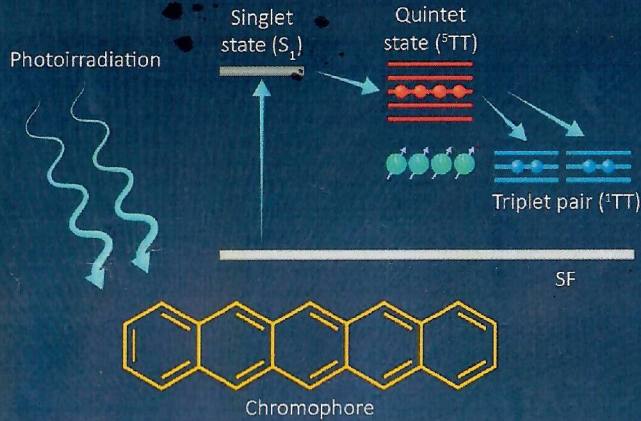


Observing Quantum Coherence of High-Spin States at Room Temperature

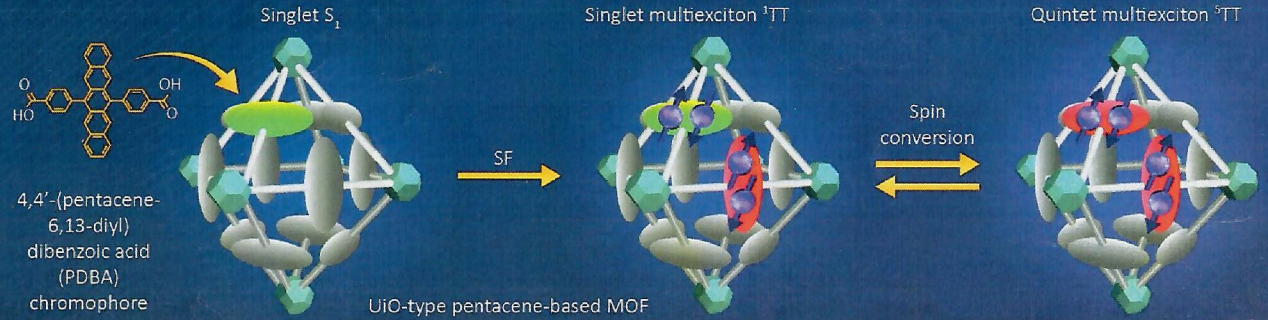
Spin evolution of a triplet pair formed by singlet fission (SF) results in the generation of a four-spin entangled quintet multiexciton



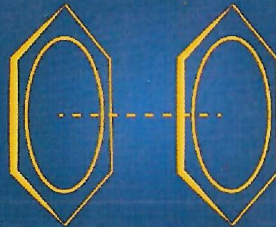
High-spin polarized states are desirable as spin quantum bits (qubits) for quantum operations

But quantum coherence of the 5TT state has been observed only at cryogenic temperatures of 75 K ($-198\text{ }^\circ\text{C}$) or lower

Room-temperature quantum coherence of the 5TT state with metal-organic frameworks (MOFs)

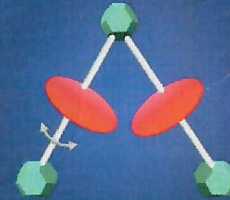


Effect on π -stacking



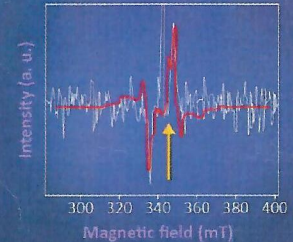
- π -stacking between pentacene planes is prevented
- Spin conversion from 1TT to 5TT

Dense integration of PDBA



- Chromophore motion suppressed
- Decoherence of the 5TT state prevented

Effect on quantum coherence



Room-temperature quantum coherence for over 100 ns



MOFs suppress the molecular motion of chromophores at room temperature to achieve quantum coherence of the 5TT state

Room-temperature quantum coherence of entangled multiexcitons in a metal-organic framework

Yamauchi *et al.* (2024) | *Science Advances* | DOI: 10.1126/sciadv.adi3147