Research Area: Ultrafast dynamics of excitons; relaxation, energy transport, charge transfer

Efficient Singlet Exciton Fission in a Pentacene Dimer

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We report fast and efficient intramolecular singlet exciton fission in a covalent dimer of pentacenes, consisting of two covalently bonded nearly orthogonal pentacene units. Fission to triplet excitons from this ground state geometry occurs within 1 ps and and can achieve a triplet yield up to 190%. The process competes with conformational relaxation in the excited state and exhibits a sensitivity to solvent polarity. The near orthogonal arrangement of the pentacene units is unlike any structure currently proposed for efficient singlet exciton fission and points toward new molecular design rules.

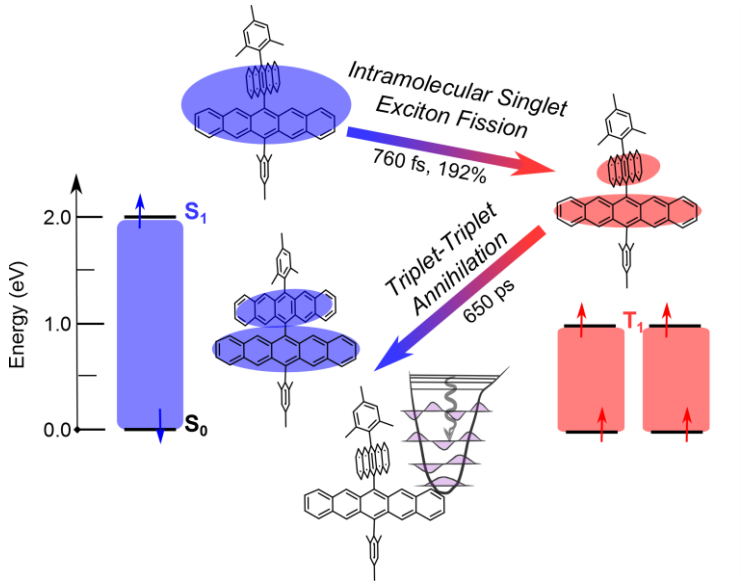

Figure 1- Scheme illustrating the process of singlet exciton fission in pentacene dimer and the subsequent following process.