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Singlet and quintet triplet pair states in organic singlet fission materials. MATTHEW SFEIR, Brookhaven National Laboratory, SAMUEL SANDERS, Columbia University, MURAD TAYEBJEE, University of New South Wales, ELANGO KUMARASAMY, LUIS CAMPOS, Columbia University, DANE MCCAMEY, University of New South Wales — We have recently demonstrated efficient intramolecular singlet fission (iSF) materials that achieve multiple exciton generation in isolated (i.e., in dilute solution) polymers and small molecules with multichromophore character. Still, fundamental questions remain concerning the electronic and mechanistic requirements that drive singlet fission in these materials, including the nature and dynamics of multiexciton (triplet pair) states. These iSF materials offer a unique platform in which to study the dynamical evolution of multiexciton states, since the system can be constrained such that exactly two triplet sites exist on the molecule. Using correlated ultrafast optical and electron spin resonance measurements, we identify long lived triplet pairs that exist in net singlet and net quintet spin multiplicities. We identify structure-function relationships that promote the dissociation of triplet pairs into free triplets and discuss implications for device applications.

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