

화학과 세미나

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Challenges in Singlet Fission and Breakthroughs by Time-Resolved Spectroscopies

Identifying coherent electronic and spin processes in singlet fission has long posed challenges. To address the challenge, a new model for coherent multiexciton generation in organic semiconductor materials has been proposed. While the multiexciton state—composed of two entangled triplet excitons—was typically formed through a singlet exciton precursor state, the recent finding reveals that the entangled triplet pair state can be directly photoexcited from the ground state of organic materials. Using ultrafast transient absorption spectroscopy and a library of pentacene-based materials, a mechanism supporting this new coherent model has been elucidated. For the process involving multiexciton spin dynamics, time-resolved magneto-optical measurements explicitly confirmed the quintet intermediate model for multiexciton decorrelation. By employing two time-resolved magneto-optical techniques and a delicate suite of material structures, the structure–property relationship in multiexciton spin dynamics has been elucidated.

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