SFB1242

SFB 1242 Nichtgleichgewichtsdynamik kondensierter Materie in der Zeitdomäne

UNIVERSITÄT DUISBURG ESSEN

Open-Minded

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Exciton Dynamics and Solar H_2 Generation in Quantum Confined Nanoheterostructures

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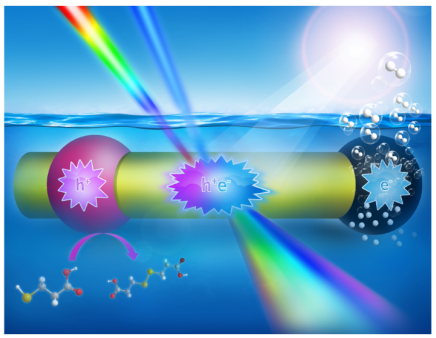
Quantum confined semiconductor nanocrystals (0D quantum dots, 1D quantum rods and 2D quantum wells) have been intensively investigated as light harvesting and charge separation materials for photovoltaic and photocatalytic applications. The efficiency of these semiconductor nanocrystal-based devices depends on many fundamental processes, including light harvesting, carrier relaxation, exciton localization and transport, charge separation and charge recombination. The competition between these processes determines the overall solar energy conversion (solar to electricity or fuel) efficiency. Quantum confined semiconductor nano-heterostructures, combining two or more material components (such as CdSe/CdS dot-in-rod nanorods or core/crown nanosheets), offer unique opportunities to control their charge separation properties by tailoring their compositions, dimensions and spatial arrangement. Further integration of catalysts (heterogeneous or homogeneous) to these materials form multifunctional nano-heterostructures, such as CdSe/CdS/Pt, that are shown to be efficient photocatalysts for light driven H_2 generation. Using 0D, 1D and 2D nano- heterostructures as model systems, we directly probe the above-mentioned fundamental exciton and carrier processes by transient absorption and time-resolved fluorescence spectroscopy. We are examining how to control these fundamental processes through the design of heterostructures to achieve long-lived charge separation and efficient H_2 generation. In this talk, we will discuss the mechanism of exciton transport, dissociation, and key factors limiting H_2 generation efficiency in 1D and 2D nanoheterostructures.



Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.

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