**Study on Charge Carrier Dynamics of Organic Photovoltaics and Photocatalysts**

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Herein the morphology and exciton/charge carrier dynamics in bulk heterojunctions (BHJs) of various donor polymers and molecular acceptors are investigated. The impact of polymer-nonfullerene acceptor (NFA) blend composition upon morphology, energetics, charge carrier recombination kinetics, and photocurrent properties are studied. Transient absorption spectroscopy reveals the importance of an energetic cascade between mixed and pure phases in the electron–hole dynamics in order to well separate spatially localized electron–hole pairs. It appears that the increase in NFA electron affinity in pure phases relative to mixed phases is correlated with a transition from a relatively planar backbone structure of NFA in pure, aggregated phases, to a more twisted structure in molecularly mixed phases. I will then go to address the charge carrier dynamics in organic photocatalytic nanoparticles for hydrogen evolution. We investigate the mechanism behind the dependence of photocatalytic activity on Pd content for a linear polymer, and place particular emphasis on the effect of Pd on the excited state of the polymer and on the accumulation of long-lived charges during catalysis. I will address the novel concept of the organic nanoparticles for visible light absorption and efficient charge separation.