

Type of Position: PhD (TV-L13, 67%), FSU Jena, Germany

Research Area: Physical Chemistry

Principle Investigator (PI): Prof. Dr. Benjamin Dietzek-Ivanšić

Name of Institute: Institute of Physical Chemistry/Department Functional Interfaces
Friedrich Schiller University Jena (FSU Jena), Germany

TRR234-A1: Strategies for Molecular Repair and Self-regulation in Light-driven Catalysis for Hydrogen Evolution (Dietzek-Ivanšić/Rau)

The project will strive for developing active repair strategies leading to recycling of the molecular catalyst and creating self-regulating supramolecular light harvesting complexes, which funnel excitation energy to the photocatalyst. Active repair by $^1\text{O}_2$ has been demonstrated for the $[(\text{tbbpy})_2\text{Ru}(\text{tpphz})\text{PtI}_2](\text{PF}_6)_2$ system leading to a significantly increased overall TON. More selective and milder active repair mechanisms shall be developed utilizing, e.g. catalytic re-oxidation by polyoxometalates. Self-regulating antenna complexes will be incorporated based on hydrogen bonding and $\pi\pi$ -interactions, which disintegrate, e.g. upon changes of pH value.

Short description of the Job: In close collaboration with synthetic inorganic chemistry, light-induced function-determining excited-state processes in molecular photocatalysts are studied by optical spectroscopy, e.g. resonance Raman, transient absorption and time-resolved emission spectroscopy. We will derive structure-dynamics-function relationships describing the role of molecular structure elements in controlling the light-induced reactivity. Within the project optical time-resolved spectroscopy is combined with transient absorption spectroscopy to study the photophysical properties of intermediates in complex electron transfer chains. Finally, we will implement pump-pump-probe spectroscopy to follow intra- and intermolecular charge transfer steps involved in molecular photocatalysis.

The successful applicant will have strong interest in physical inorganic chemistry and have some previous knowledge in optical spectroscopy. He/she should be highly motivated to work in an interdisciplinary and international team and should have excellent written and oral communications skills in English.