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

Research Area: Physical Chemistry

Principle Investigator (PI): Prof. Dr. Juergen Popp

Name of Institute: Institute of Physical Chemistry and Abbe Center of Photonics
Friedrich Schiller University Jena (FSU Jena), Germany

TRR234-C2: Operando Multi-spectroscopic Correlation Analysis of Electronic and Structural Changes During Homogenous and Heterogeneous Catalytic Activity (Mizaikoff/Popp/Ziegenbalg)

The project will integrate online (micro)spectroscopic methods into flow photoreactors to provide in situ/operando information of molecule-in-matrix systems under light-driven catalytic conditions. Specifically, vibrational (IR, Raman) and fluorescence spectroscopic (e.g., FLIM) methods in combination with artificial intelligence methods will be used for qualitative and quantitative spatiotemporal investigations and characterization of photocatalytic systems in terms of reactivity, stability, response to external stimuli (e.g., change of pH), etc.

Short description of the Job: The PhD project will focus on the integration of a multi-spectroscopic (imaging) platform combining (resonance-)Raman-spectroscopy, non-linear Raman techniques such as coherent anti-Stokes Raman spectroscopy (CARS) or stimulated Raman spectroscopy (SRS), complemented by fluorescence lifetime microscopy (FLIM) into flow photoreactors developed within the CataLight consortium to facilitate light-driven operando reaction monitoring and reveal optimization opportunities for synthesis and reaction engineering in close collaboration with synthetic inorganic chemistry groups. The combination of the afore-mentioned spectroscopic methods with computer-assisted spectroscopic analysis based on two-dimensional correlation (2DCOS) as well as novel artificial intelligence (AI) methods will be further developed. Here, hetero-2DCOS approaches will be utilized to analyze the multi-spectroscopic data to derive structure-function relationships for the molecule-in-matrix systems under investigation. AI methods (i.e., machine/deep learning strategies) will be employed for spectroscopic data correlation and fusion.

The successful applicant will have strong interest in physical chemistry with some previous knowledge in molecular spectroscopy and possibly computer aided data analysis. 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.