

Type of Position: PhD (TV-L13, 67%), Ulm University, Germany

Research Area: Inorganic Chemistry

Principle Investigator (PI): Dr. Montaha Anjass

Name of Institute: Institute of Inorganic Chemistry I
Ulm University, Germany

TRR234-B11: Photoactive Electrospun Nanofibers as Materials for Light-driven Catalysis (Anjass/Dietzek-Ivanšić)

The project focuses on the design and fabrication of photoactive nanofiber mats by integrating hydrogen evolution reaction (HER) or oxygen evolution reaction (WOC) catalysts (CATs) and molecular photosensitizers (PS) during electrospinning into polymeric nanofibers. In this respect this project will address various material systems, starting with easily accessible components such as POM-CATs (POM: Molecular metal oxides, polyoxometalate), $[\text{Ru}(\text{bpy})_3]^{2+}$ -PS and polyacrylonitrile (PAN) polymers. In a later phase, will integrate advanced and custom-designed molecular components from within CATALIGHT, including PS, CATs, and covalent PS-CAT dyads, metal-free organic chromophores and water-soluble carbon nitrides. Furthermore, this work will expand on optimizing the electrospinning of functionalized PAN and the surface modification of electrospun PAN as well as functional polymers, electrically conductive and/or redox-active polymers.

Short description of the Job: The design of functional electrospun polymer nanofibers using electrospinning technique, into which molecular photosensitizers and catalysts are embedded. Explore different approaches for integration of catalysts and photosensitizers into the soft matter matrices and attempts to tune the catalytic activity by using different polymers, e.g., conductive or redox-active materials. Study how nanostructural features, such as catalyst/photosensitizer loading, surface morphology, fiber thickness, and porosity impact the overall light-driven catalytic HER and WOC performance.

The successful applicant will have strong interest in inorganic chemistry and have some previous knowledge in chemistry or material science. 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.