

# IMPRS on Multiscale Biosystems

## Project description

**Title:** Photocatalytic Organic Reactions within Chiral Organic Frameworks

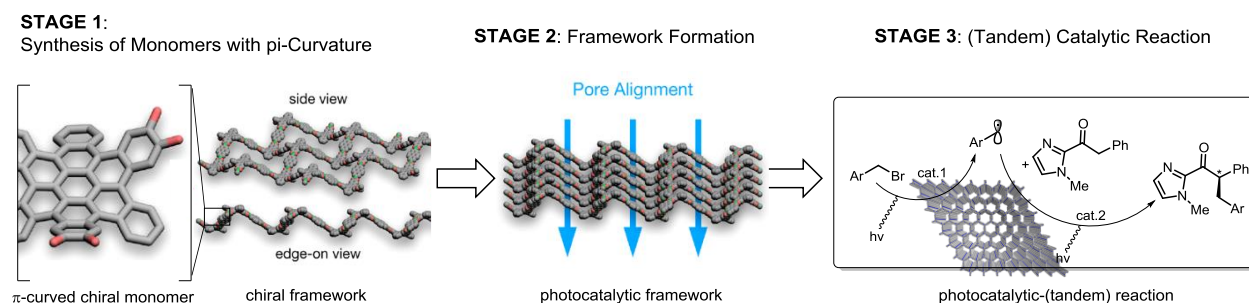
**PI:** Oliver Dumele (HU Berlin)

**In collaboration with:** Bartholomäus Pieber (MPIKG)

### Project description:

The aim of this project is to develop a porous platform based on covalent organic frameworks (COFs) for applications in photocatalytic reactions. The concept of soft materials that integrate all necessary molecular components to produce storable fuels and useful chemicals with the aid of sunlight as the energy source is an appealing goal with potential impact in renewable energy. The use of such designed materials with integrated functions is bioinspired by the internal structure of chloroplasts in plants. While natural photosynthesis can be coupled to proton-reduction catalysts to efficiently convert sunlight directly into hydrogen, synthetic materials are potentially better targets for renewable energy platforms and catalysis.

This project focuses on the synthesis of polyaromatic monomers with  $\pi$ -curvature as subunits for Covalent Organic Frameworks. As the  $\pi$ -curvature will introduce chirality to the overall framework, a chiral environment is created in such highly porous materials. The known photocatalytic activity of these frameworks will be applied to induce enantioselective transformations within the pores of the COFs.



**Figure:** Stepwise construction of chiral non-planar Covalent Organic Frameworks for enantioselective photocatalysis.

**Required background:** Applicants should have a background in organic synthesis, catalysis, or material science.

**Paper to read before the interview:** Contorted Polycyclic Aromatics: *Acc. Chem. Res.* **2015**, *48*, 267–276; Photochemical Strategies for Carbon–Heteroatom Bond Formation: *Eur. J. Org. Chem.* **2019**, DOI: 10.1002/ejoc.201901173

**Contact:** dumelelab.com, oliver.dumele@hu-berlin.de