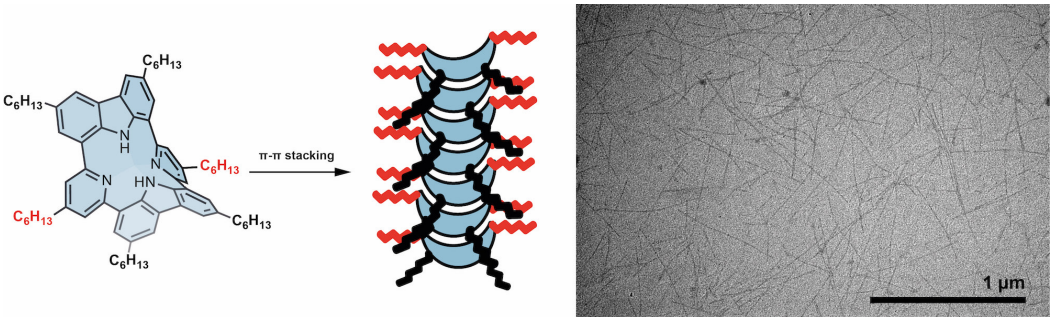
Restricting the Shape-Assisted Self-Assembly of Carpyridines to One Dimension

L. Gallego[1], J. F. Woods[1], R. Butti[1], P. Szwedziak[2], A. Vargas Jentzsch[3], M. Rickhaus[1]*

[1]Department of Chemistry, University of Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland, [2]Centre for Microscopy and Image Analysis, University of Zurich, 8057 Zurich, Switzerland, [3]SAMS Research Group, University of Strasbourg, Institut Charles Sadron, CNRS; 67200 Strasbourg, France

Shape-Assisted Self-Assembly (SASA) is a process in which the shape of a monomeric unit enforces the order between monomeric units needed for supramolecular assemblies in the absence of strong non-covalent interactions such as H-bonding.[1-3] Saddle-shaped molecules stand out for these processes due to the translational and rotational rigidity of the monomers within the stacks. Carpyridines (CPs) are porphyrin-related metal-containing macrocycles bearing two carbazole and two pyridine units alternately connected through ortho aryl-aryl bonds.[1,2] This arrangement results in a saddle-shaped structure, where prefunctionalized building blocks allow the synthesis and tuning of properties of these macrocycles. These units have shown to be effective towards supramolecular assembly purely based on p-p interactions and assisted by the shape of the monomers, demonstrating the significance of shape in self-assembly processes. Alkyl substitution onto the carbazoles has allowed us to study 2D sheet formation,[1,2] which combined with substitution onto the pyridines with different side chains allows us to study the mechanism of assembly of the monomers into oligomers, and ultimately, into micrometer-long fibers.[4]



[1] Joseph F. Woods, Lucía Gallego, Pauline Pfister, Mounir Maaloum, Andreas Vargas Jentzsch, Michel Rickhaus, *Nat. Commun.*, ***2022***, *13*, 3681.
[2] Joseph F. Woods, Lucía Gallego, Amira Maisch, Dominik Renggli, Corrado Cuocci, Olivier Blacque, Gunther Steinfeld, Andres Kaech, Bernhard Spingler, Andreas Vargas Jentzsch, Michel Rickhaus, *ChemRxiv* **2023**. https://doi.org/10.26434/chemrxiv-2023-whjkw.
[3] Lucía Gallego, Joseph F. Woods, Michel Rickhaus, M. *Organic Materials*, **2022**, *4*, 137–145.
[4] Lucía Gallego, Joseph F. Woods, Rachele Butti, Piotr Szwedziak, Andreas Vargas Jentzsch, Michel Rickhaus, *under review*.