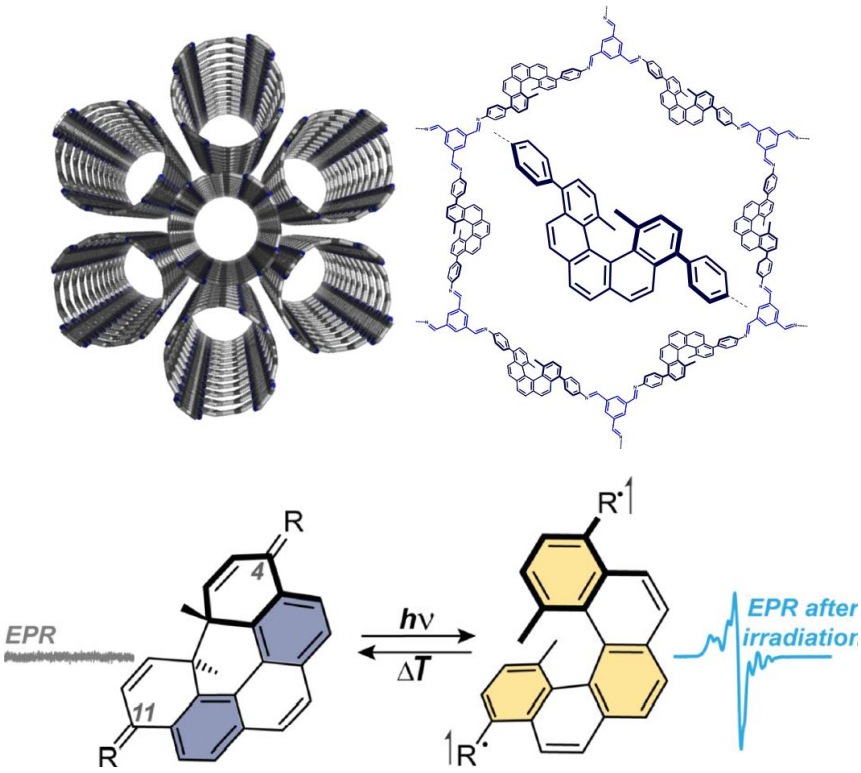
Curvature in Carbon Materials:

Strained Macrocycles, Non-planar Frameworks, and Helical Photomagnetic Switches

Oliver Dumele, Humboldt University Berlin

Constructing covalent organic frameworks (COFs) based on symmetric small molecules has majorly been done in layered architectures as two-dimensional materials. Our synthetic approach leaves the flatland of two dimensional materials. We aim at molecules that step beyond the known architectures by constructing non-planar, chiral, tubular, and electronically exotic topologies. Along this journey, we have made unexpected discoveries on the monomer level that directed us to new fields, such as photochemical spin state switching in a molecular level.

The seminar reports on a range of molecular monomers as well as entire frameworks with surprising molecular behavior and unexpected synthetic challenges. Unusual structures, high supramolecular affinities, and useful magnetic properties are some of the desirable characteristics of these materials.



Oliver Dumele studied Chemistry at the University of Mainz (Germany) and UC Berkeley (USA). After research projects at the Max Planck Institute for Polymer Research, BASF Ludwigshafen, and the National University of Singapore, he moved to Switzerland for his doctoral research. In 2015, he received his PhD in chemistry from ETH Zürich under supervision of Prof. François Diederich. After a postdoc in the group of Prof. Samuel Stupp at Northwestern University (USA), he returned to Germany in 2019 as Liebig research group leader at Humboldt University Berlin. Since 2022 he is the leader of a BMBF Junior Research Group. The focus of his work is on functional organic materials in their monomeric and framework phase to explore supramolecular binding, chirality, spin effects, magnetic switching, and energy storage.