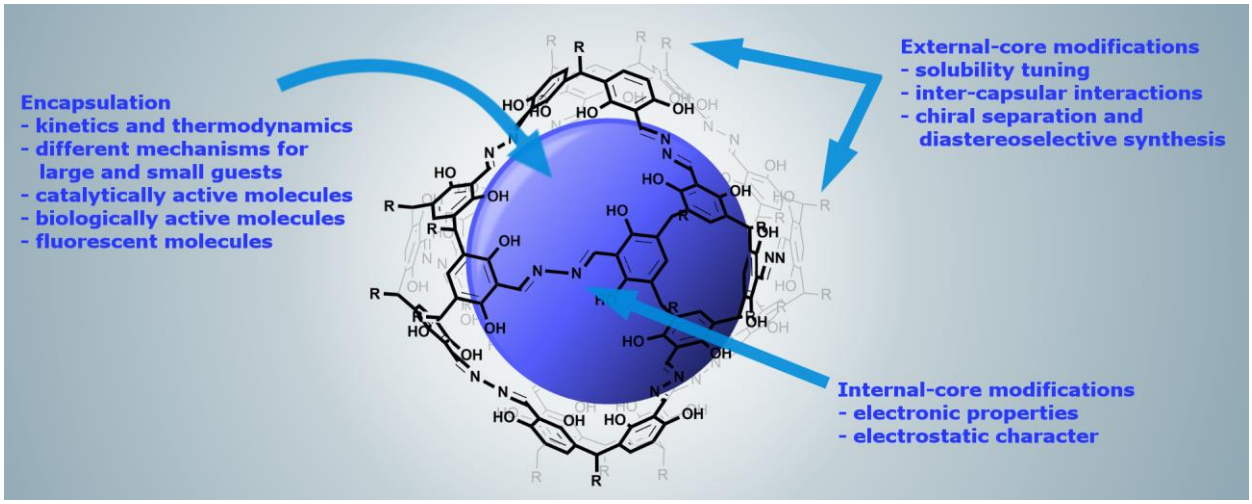
Tuning the properties of organic cubic cages with intrinsic chirality and porosity

Molecular cages are defined as discrete entities made of one or more molecules that are able to complex smaller molecules in their interiors and separate/isolate them the external environment. The cages find applications in separation, storage and controlled release of guest molecules. They are also used as reaction nanovessels that provide unusual selectivity and catalytic activity. Synthesis of such molecular cages is very challenging because it usually requires formation of numerous covalent bonds simultaneously (formation of even a single covalent bond can be sometimes problematic) and additional precautions to avoid collapsing. Therefore, the number of known molecular cages is small, and their number decreases drastically with the increasing number of components and size.



Recently, our research group have synthesized a new hexameric molecular cage that has unique features: it is formed using a very simple protocol, it is chiral and it has a large cavity. In the current project we plan to study in-depth the features of this cage and further fine-tune its properties towards specific applications i.e., towards development of enzyme-like catalytic activity, intrinsically porous solid materials, drug-delivery systems or materials with modulated fluorescence properties. In the long run, we expect that these cages, being themselves a scientific novelty, can find practical applications in catalysis, drug delivery and material science.