

## Exploring Gold-Catalyzed Reactions in Self-Assembled Hexameric Resorcin[4]arene Cages

Chemical reactions play an essential role in Nature and in our society, because they enable the conversion of molecular building blocks into valuable compounds such as (bio)polymers, fine chemicals and fuels. Catalysts can make these reactions proceed faster or under milder conditions. In addition, they can induce more selective reactions, thereby reducing the waste generated in the overall chemical transformation.

Homogeneous catalysts are primarily based on transition metal complexes. A recent strategy involves control of catalyst properties via the second coordination sphere through catalyst encapsulation in well-defined (supra)molecular cages. Using this approach, the catalyst and the reactants are (partly) isolated from the bulk solution and can interact with the interior of the capsule. Potential effects of the confined space are enhanced stabilization of catalytically relevant species and preorganization of substrate(s), leading to different activity and reactivity than when the catalyst is used in bulk solution.

Catalyst encapsulation has proven to be a very promising strategy in homogeneous catalysis based on gold(I) complexes. Gold complexes are widely used in organic synthesis to perform chemical transformations of molecules containing carbon-carbon  $\pi$ -bonds (e.g. alkenes, alkynes) and they can be effectively encapsulated in self-assembled hexameric resorcin[4]arene cages. The research described in this thesis shows that the encapsulation of simple, traditional gold(I) NHC complexes in these cages can drastically alter their activity and reactivity. As a result, the use of the second coordination sphere leads to the formation of new products, substrate selectivity and switchable systems.