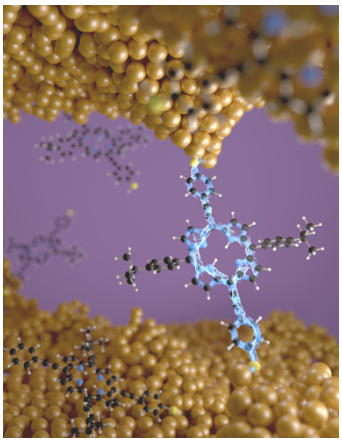
Designing a “perfect” porphyrin molecule for the Mechanically Controllable Break Junction Experiments



Abstract :

The biggest challenge of molecular electronics is to condense the functionality of an electronic device into a single molecule and to exploit the functional versatility offered by the chemical diversity of molecules for electronic device purposes.

Porphyrins and their related macrocycles are promising building blocks for the construction of bio-inspired molecular devices. Nature itself offers magnificent examples of porphyrin usefulness, such as activating and transporting molecular oxygen in mammals and harnessing sunlight in plant photosynthetic systems.

In spite of their potential, obtaining well defined single-molecule conductance features is a difficult task. Due to π-stacking porphyrins can form a variety of junction configuration, leading to a large spread in conductance values using the mechanically controllable break junctions (MCBJ) technique. This limits the further progress in investigating the molecular functionalities on a single molecule level in porphyrin molecules.

In this presentation, I will show that by close interaction between synthetic chemists and physicists a “perfect” porphyrin molecular design for mechanically controllable break junctions can be achieved, leading to well defined, highly conducting molecular junctions. This opens further prospects for studying mechano-sensitive porphyrin based molecular junctions.