NON-EQUILIBRIUM SELF-ASSEMBLY OF ELECTROACTIVE SYSTEMS

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High-energy supramolecular interlocked structures have attracted considerable attention in recent decades, and they might offer unconventional strategies to harvest energy from various external sources (e.g., chemical, redox, or light inputs).[1] Fine-tuning the kinetic of a system is crucial and plays an important role in developing out-of-equilibrium systems. To this aim, pseudorotaxanes are ideal platforms because simple structural modifications can drastically modify the kinetics of their threading/dethreading processes.

Inspired by the seminal work of the Stoddart group,[1,2] we investigated kinetically trapped states upon alternating redox stimuli in systems composed of a derivative of the macrocyclic cyclobis(paraquat-*p*-phenylene) host and paraquat derivative guests. In particular, we used click chemistry to prepare multifunctional structures comprising either multiple guests or multiple hosts.[3] The formation of pseudorotaxanes, between these multifunctional hosts and guests, is expected to take place upon reduction of the two components, thanks to radical pairing interactions (Fig.1). The combination of spectroelectrochemistry, differential pulse voltammetry, and tailored cyclic voltammetry analysis, revealed peculiar effects of the different systems.

Our ongoing studies contribute to the development of redox-driven non-equilibrium systems

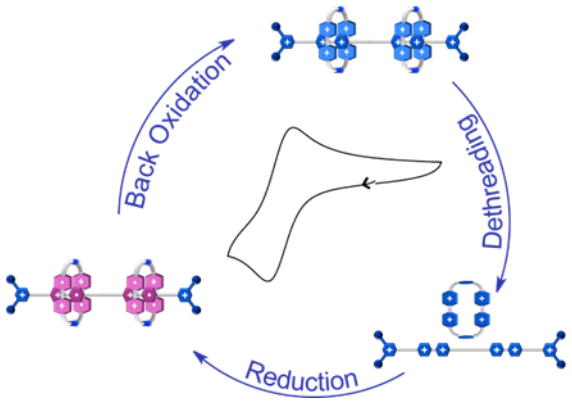

Figure 1: Schematic representation of an electrochemical reduction/oxidation cycle coupled with an assembly/disassembly of the host and guest molecules.

References

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