Supramolecules, Nanoswitches, and Nanorotors in Action

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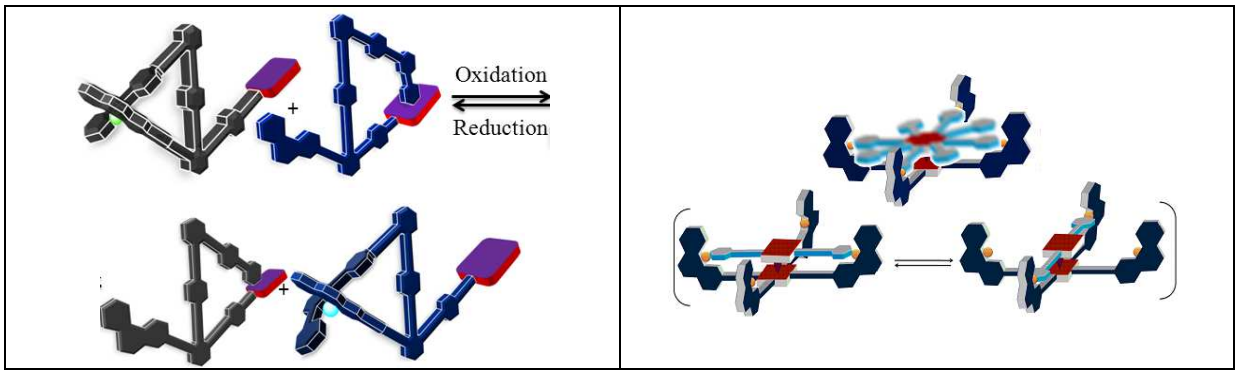
Nature masterfully utilises *self-assembly* and *self-organisation* together with *self-sorting* for erecting the graceful and complex biomolecular machinery from which life is built on our earth. For instance, all cellular devices, such as ribosomes, mitochondria and many smaller multicomponent enzyme complexes, are prepared by arranging a crowd of prefabricated covalent building blocks in the proper spatial arrangement through noncovalent interactions. As a result, heteroaggregates are at the heart of many specific biological functions, signalling cascades and feed-back protocols.

Due to many amazing biological systems, the preparation of intricate heteroaggregates in a holistic manner has turned into an attractive research area within *abiological self-assembly*. Implementation of emergent functions in multicomponent assemblies is at present one of the chief challenges. Because any emergence arises only when all components find themselves in the proper spatiotemporal arrangement, the outcome may not be directly predicted by considering the subcomponents in isolation. Our heteroleptic tool kits with their high level of constitutional control in combination with self-sorting offers new chances for the rational design of multicomponent assemblies with tunable properties, as guided by compositional, constitutional and conformational changes. As a result, our research has led to functional nano-assemblies in areas, as diverse as supramolecular splicing,[1] metal ions sensing, [2] nanoswitches,[3] molecular electronics,[4] host-guest chemistry,[5] dynamic polymers, [6] and nanorotors[7].

In the present talk we will address a topical selection of functional molecular machinery from our recent work, with an emphasis on nanoswitches and nanorotors.



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