An Electrochemically-Controlled Molecular Shuttle

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In this contribution we will present novel homo- and hetero-[2]catenanes (and bismacrocycles) self-assembled using macrocyclic transition metal complexes and benzo-crown ether as building blocks and discuss interactions between two metal centers via $\pi \ldots \pi$ interactions. We will present the first example of heterodinuclear bismacrocyclic transition metal complex exhibiting potential-driven intramolecular motion of the interlocked crown ether unit. To our knowledge, this is the first instance of a transition metal heterodinuclear catenane which reveals translocation of the crown unit back and forth between two different metal centers in response to an external stimulus – an applied potential. By applying appropriate potentials either copper or nickel (or both) are reversibly oxidized to the higher (+3) oxidation state. This favours interaction with the π-electron-rich aromatic system of the crown unit which relocates the crown towards the oxidized metal center. The nickel centers affected by the hydroquinol groups are oxidized more easily than those not surrounded by the crown units. This "frozen" interconversion within the molecule can be better observed at lowered temperature or shorter time scales. The phenomenon of controlled intramolecular motion can potentially be applied in molecular devices.

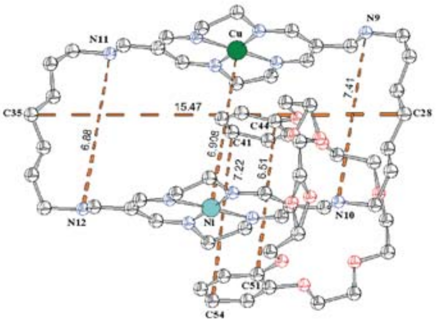

Figure 1. Novel hetero-[2]catenane with hydrogens omitted for clarity.

[1] [Enter a reference here]
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