The synthesis, symmetry and applications of interlocked molecules

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Threading one molecule through another to generate what is now called "the mechanical bond" was first discussed in 1912[1] but it took a further 50 years for the first synthetic example to be produced in extremely low yield.[2] From there, it took another 22 years for the first scalable synthesis to be reported[3] and it is only recently that the synthesis of such molecules has become relatively trivial, allowing their potential applications to be studied and developed. Of these possible applications, the most famous is the use of catenanes and rotaxanes as components of molecular machines.[4] However, the mechanical bond also augments the chemical properties of the threaded molecules.[5]

In the Goldup Group we develop simple methods and concepts to access challenging mechanically interlocked structures so that we can demonstrate the potential chemical applications of the mechanical bond in catalysis,[6] sensing,[7] coordination chemistry,[8] chemical biology,[9] materials science and indeed anywhere that molecules are used! We have a particular interest in how the mechanical bond leads to unusual forms of stereochemistry.[10] My lecture will give an overview of our activities.

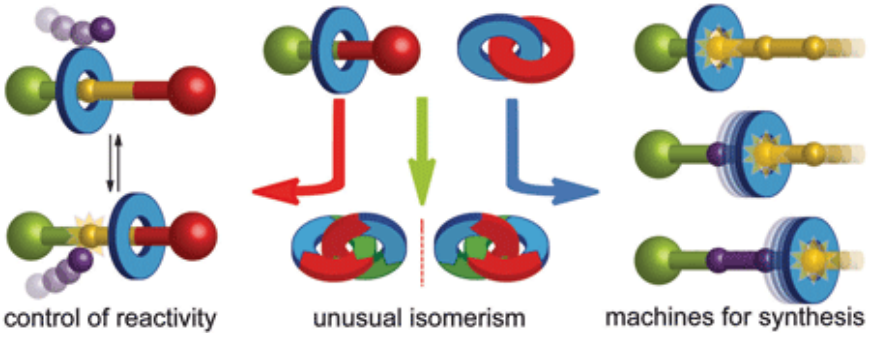

Figure 1. Chemical consequences of the mechanical bond

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