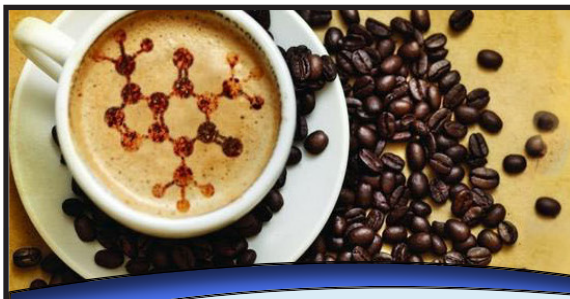

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EXTENDED EDITION

Translocators of Macrocycles: Toward the general Synthesis of any kind of Interlocked Molecules

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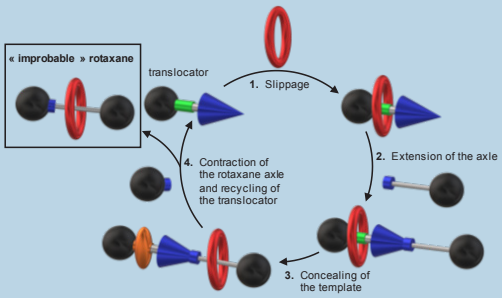
The 2016 Nobel Prize in Chemistry awarded to J. –P. Sauvage, F. Stoddart and B. Feringa has highlighted the field of molecular machines. As part of these appealing molecules, interlocked compounds hold a singular place because their interwoven molecular architectures give them remarkable physical and chemical properties with respect to non-interlocked analogues. More interestingly, the possibility to glide with an accurate control one interlocked element with respect to others, upon an external stimulus, affords several co-conformers with very distinct properties.



The use of dynamic covalent bond to prepare interlocked molecular architectures generally suffers from low yields due to their fastidious multi-step chemical route, while statistically driven strategies can only lead to a very small proportion of interlocked components due to the improbability for the supramolecular elements to recognize. This certainly explains why template-driven approach, through weak bonds recognition between the various supramolecular elements to assemble, is nowadays the most popular used method because of its efficiency and practicality. However, according to us, this strategy has the main drawback that interlocking cannot be generalized to any molecules since they must necessarily contain at least one motif of recognition between the elements to assemble. After highlighting the synthesis and actuation of various triazolium-containing molecular machines,[1] we present an alternative efficient route to any kind of interlocked molecules, even those that are devoid of any templates.[2-3] It combines the template-driven synthesis of an interlocked molecular precursor through the help of a translocator [4] that can catch a macrocycle before releasing it through shuttling motion to any kind of molecular axles, if sterically possible, even if no recognition site for the macrocycle is present on the targeted axle.

1) F. Coutrot, ChemistryOpen, 2015, 4, 556-576.
2) Chao, S.; Romuald, C.; Fournel-Marotte, K.; Clavel, C.; Coutrot, F., Angew. Chem. Int. Ed. 2014, 53, 6914-6919.
3) Waelès, P.; Clavel, C.; Fournel-Marotte, K.; Coutrot, F., Chem. Sci. 2015, 6, 4828-4836.
4) Riss-Yaw, B.; Clavel, C.; Laurent, Ph.; Coutrot, F., Chem. Commun. 2017, 53, 10874-10877.

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