Covalent and flexible architectures incorporating porphyrins as stimuli-responsive receptors

Valérie Heitz,[a]

[a] *Laboratoire de Synthèse des Assemblages Moléculaires Multifonctionnels, Institut de Chimie de Strasbourg CNRS/UMR 7177, Université de Strasbourg*
E-mail: v.heitz@unistra.fr

Porphyrins have been incorporated in many multicomponent systems for various applications due to their appealing coordination, electronic and photophysical properties. The synthesis of three-dimensional architecture with metalloporphyrins as active components gave rise to attractive structure for molecular recognition or chemical transformation.[1] By analogy with biological processes, molecular cages that incorporate both binding and regulation sites are appealing systems for an allosteric control of their properties as receptor, catalyst or drug carrier.[2] Such structures remain challenging and require to adjust the spatial arrangement of the active components to prevent them to interact together.

Our group has developed porphyrin cages with peripheral binding sites and their synthesis and properties will be discussed.[3,4] Thus, covalent cages with flexible linkers that incorporate triazoles are able to modulate to a large extent their cavity size with a chemical stimulus (pH change or metal binding).[4] Porphyrin metallation allow to adjust the binding affinity of the cages towards different kinds of guest molecules. We will discuss the ability of these flexible cages to behave as switchable receptors controlled by the reversible binding of metal ions(Fig.1). [4d]

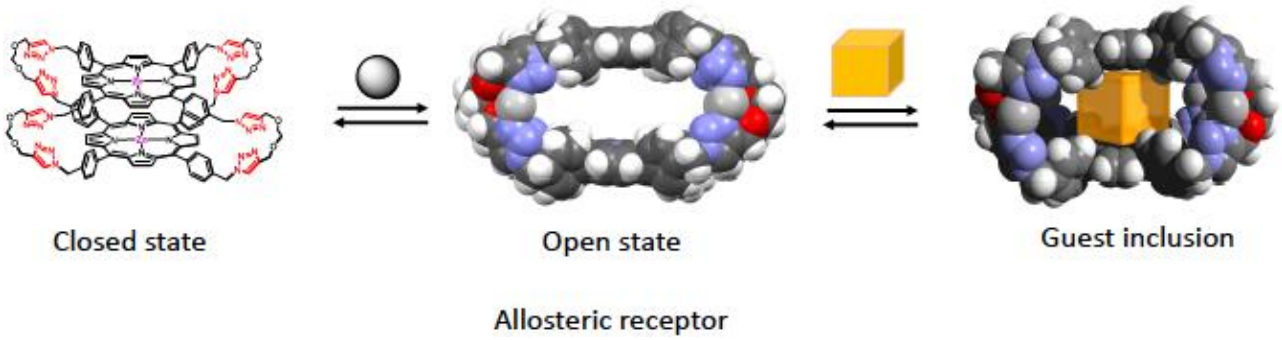

Figure 1. **Allosteric control of the receptor properties of a flexible covalent cage**.

1. a) S. Durot, J. Taesch, V. Heitz, *Chem. Rev.,* **2014**, *114*, 8542. b) S. H. A. M. Leenders, R. Gramage-Doria, B. de Bruin, J. N. H. Reek, *Chem. Soc. Rev.,* **2015**, *44*, 433
2. a) A. J. McConnell, C. S. Wood, P. P. Neelakandan, J. R. Nitschke, *Chem. Rev. **2015**, 115,* 7729. b) C. Kremer, A. Lützen, *Chem. Eur. J.*, **2013**, *19*, 6162.
3. a) S. Durot, L. Flamigni, J. Taesch, T.T. Dang, V. Heitz, B. Ventura, *Chem. Eur. J.* **2014**, *20*, 9979. b) P. Ballester, M. Claudel, S. Durot, L. Kocher, L. Schoepff, V. Heitz, *Chem. Eur. J*. **2015**, *21*, 15339.
4. a) J. Taesch, V. Heitz, F. Topic, K. Rissanen, *Chem. Commun.*, **2012**, *48*, 5118. b) L. Kocher, S. Durot, V. Heitz, *Chem. Commun*. **2015**, *51*,13181. c) L. Schoepff, L. Kocher, S. Durot, V. Heitz, *J. Org. Chem.,* **2017**, 82, 5845. d) R. Djemili, L. Kocher, S. Durot, A. Peuronen, K. Rissanen, V. Heitz, *Chem. Eur. J.* **2019**, *25*, 1481.