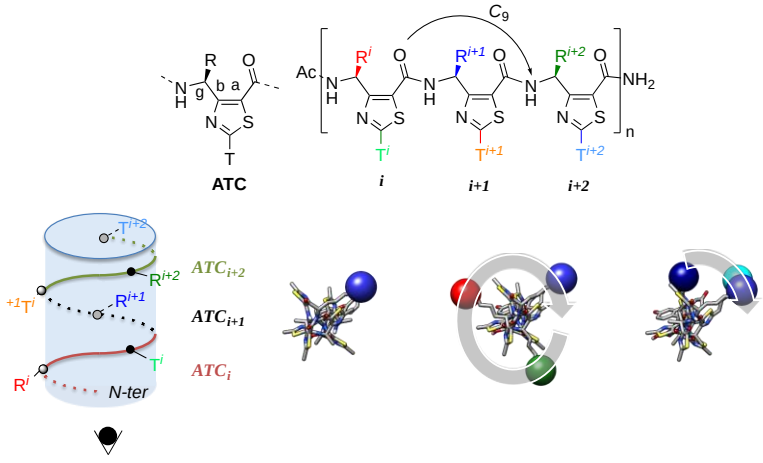
Heterocyclic γ-peptide foldamers: from conformational control to applications in organocatalysis and biomedical areas.

¶
Ludovic T. Maillard[1]
¶
[1]IBMM, UMR5247 CNRS-ENSCM-Université de Montpellier, Montpellier, France
¶
¶

Research in the foldamer area has advanced tremendously in recent years in establishing abiotic architectures, with stable and predictable folding patterns such as helices, sheets and ribbon shapes.[1] These structures are stabilized by remote intra-strand contacts including hydrogen-bonds and stereoelectronic interactions, local conformational control or solvophobic effects. In this context, our group had explored a class of constrained heterocyclic γ-amino acids built around a thiazole ring, named ATCs.[2] ATC oligomers showed high propensity to adopt a helical structure in the solid state and in organic solvents and water. The structure of the γ-peptide backbone showed low dependency on the nature of the side chains. In addition to fundamental questions of folding, the facial anisotropy of the platform ensures a perfect control of the spatial orientation of the appended functionalities essential to achieve biomedical and material applications. We present here the advances in the synthesis / structural characterization[3] and use of ATC chemistry in the fields of antimicrobial control,[4] cell targeting[5] and organocatalysis.[6]



[1] a/ S. Hecht, I. Huc, *Foldamers: Structure, Properties and Applications* Wiley-VCH, Weinheim, **2007**; b/ G. Guichard, I. Huc, *Chem. Commun.* **2011**, *47*, 5933-5941; c/ P. G. Vasudev, et al. *Chem. Rev.* **2011**, *111*, 657-687. d/ B. Legrand, L. T. Maillard, *ChemPlusChem* **2021**, 629-645 – IF: 2.86.

[2] a/ L. Mathieu, et al. *Eur. J. Org. Chem.* **2015**, *2015*, 2262-2270. b/ L. Mathieu, et al. *Angew. Chem., Int. Ed. Engl.* **2013**, *52*, 6006-6010.

[3] b/ C. Bonnel, et al. *Org. Biomol. Chem.* **2016**, *14*, 8664-8669

[4] B. Legrand, L. Mathieu, et al., *Chem. Eur. J.* **2014**, 6713.

[5] a/ M. Simon, et al. *Chem. Eur. J.*, **2018**, *24*, 11426.b/ M. Simon, et al., *Bioconj. Chem.* **2019**, 2533.

[6] a/ J. Aguesseau-Kondrotas, et al. *Chem. Eur. J.*, **2019**, 25, 7396. b/ B. Legrand, et al. *Catalysts*, **2020**, 700.