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Soutenance de thèse

Synthesis and structure-stability relationships of helical aromatic foldamers.

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At the molecular level, the functions of helical patterns are often directly associated with the stability of these architectures, (in α-helices). For example, upon removal of such an entity from the protein's tertiary structure, the peptidic helix becomes flexible and thus inactive. In order to control the rigidity of these architectures, several strategies have been used and the construction of completely artificial well folded molecules known as foldamers is one them. Our group mainly focuses on helical aromatic oligoamide foldamers and to date several studies have been carried out to investigate factors affecting the helical stability; the influence of oligomer length, solvent effects and the effect of aliphatic linkers within a helical aromatic sequence.
In the present study we investigate the helical propensity of five commonly used aromatic monomers in foldamer synthesis and by using NMR spectroscopy, X-ray crystallography and dynamic chiral HPLC we evaluate their contribution in helical stability. Additionally, inspired by the role of disulfide bonds in proteins we decided to explore their effect on helical stability. For this reason intra- and inter-molecularly disulfide bonded compounds were designed and synthesized. Their stability was studied using NMR spectroscopy, chiral HPLC and CD experiments.
Finally, the synthesis of mono-disperse helical strings of polymeric dimensions through a convergent, segment tripling strategy has been developed. This protection/deprotection free synthesis was carried out by connecting oligomeric blocks *via* a labile anhydride functionality.

Keywords: Supramolecular Chemistry, Aromatic Oligoamide Foldamer, Self-organization, Helical stability, Hydrogen bond, Aromatic composition, Disulfide bond, Anhydride, Chirality.

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