PhD in organic & supramolecular chemistry

Over the last two decades, chemists have increasingly developed the family of synthetic foldamers, defined by Gellman as “oligomers or polymers with a strong tendency to adopt a specific compact conformation”. In particular, helical foldamers have found a wide range of applications in research fields as different as HIV treatment, catalysis, photo-controlled folding, or selective guest encapsulation. A particular attention has also been paid to their rich supramolecular chemistry since some foldamers hybridize to form multistranded helices (double, triple or even quadruple ones), with distinct physico-chemical properties.

In this context, we have recently synthesized and characterized redox-active foldamers,\textsuperscript{1-3} notably endowed with tetrathiafulvalene (TTF) units at both extremities (see structure below). By taking advantage of radical-cation dimerization processes, we were able to control the equilibrium between single and double helices. This result constitutes the foundation of the ANR #RECHERCHE project, which will exploit this innovative approach to drive interstrand contacts thanks to redox-controlled non-covalent interactions.

\textit{Chemical structure of an electroactive oligopyridine dicarboxamide foldamer}

The project will notably focus on an unprecedented class of heteroduplexes (double helices made of different and complementary strands), selectively obtained through donor-acceptor interactions. This pluridisciplinary project requires skills in organic chemistry and interest in physicochemical (electrochemistry, spectroscopy, modification of surfaces) and supramolecular chemistry.

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\textbf{Start:} October 2020
\textbf{Deadline:} March, 31\textsuperscript{st} 2020