Functionalizable oligoprolines as a platform for the development of extended self-assemblies with tunable morphologies

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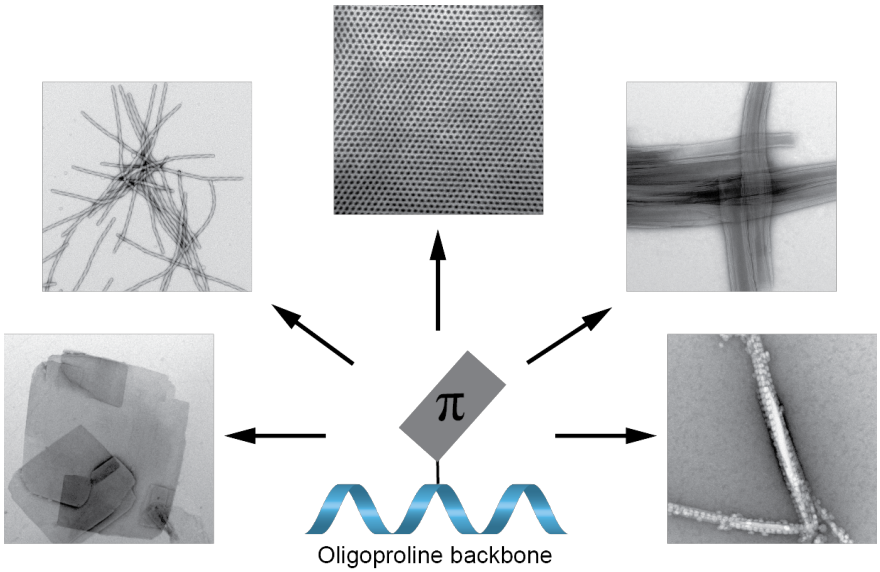
Self-assembly of π-conjugated building blocks has become increasingly important for the fabrication of functional nanostructures. Towards this goal, peptides, which readily adopt well-defined secondary structures and are highly modular, have been used to direct chromophore self-assembly into well-organized, chiral nanostructures.[1] The assembly of these conjugates has been controlled by exploiting hydrogen-bonding networks within the peptides. Here we will present the formation of highly ordered supramolecular structures built on non-self-assembling peptidic scaffolds.



Using oligoprolines as scaffolds to direct the self-assembly of conjugated systems, we achieved the hierarchical self-assembly[2,3] of various types of chromophores into fibrils, sheets, and advanced, novel topologies. Variation in length of the oligoproline and choice of chromophore and linker has allowed for facile access to a variety of supramolecular structures that do not rely on H-bonding between peptides. Thus, oligoproline π-system conjugates constitute novel and efficient tools for self-assembly towards functional nanostructures.

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[1] Ardoña, H.A.M. & Tovar, J. D. *Bioconjugate Chem.,* **2015**, *26*, 2290
[2] Lewandowska, U., Zajaczkowski, W., Chen L., Bouillière, F., Wang D., Koynov, K., Pisula, W., Müllen, K., Wennemers, H. *Angew. Chem. Int. Ed.* **2014**, *53*, 12537
[3] Lewandowska, U., Zajaczkowski, W., Pisula, W., Ma, Y., Li, C., Müllen, K., Wennemers, H. *Chem. Eur. J.* **2016** *22*, 3804