Supramolecular assemblies inspired by biomolecules: from 1D to 2D chiral templates

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Chirality is ubiquitous in Nature, down to the molecular scale as exemplified by the DNA double helix or the collagen triple helix. Inspired by these biomolecular constructs, our research is centered on the use of information-rich chiral templates to guide the organization of functional molecules for potential applications in delivery, imaging, and sensing.

In this seminar, we first discuss examples of DNA-templated 1D assemblies, for which we observed the effects of sequence and length on the supramolecular assembly of π-conjugated (macro)molecules.[1] This is harnessed to photo-modulate the organization of multi-chromophoric systems, or to probe an enzymatic activity in real time.[2-3] We then report the development of peptide surfaces as 2D chiral templates. Through the development of layers mimicking a collagen matrix, we show that epithelial cells migrate differently on mirror-image surfaces. We discuss on how chirality can effectively influence cell migration through interactions between the cytoskeleton and the self-assembled peptides.[4]

[1] M. Surin, S. Ulrich, *Chem. Open* **2020**, 9, 480.
[2] J. Rubio-Magnieto, T.-A. Phan, M. Fossépré, V. Matot, J. Knoops, T. Jarrosson, P. Dumy, F. Serein-Spirau, C. Niebel, S. Ulrich, M. Surin, *Chem. Eur. J.* **2018**, *24*, 706.
[3] M. Fossépré, M. Trévisan, V. Cyriaque, R. Wattiez, D. Beljonne, S. Richeter, S. Clément, M. Surin, *ACS Appl. Bio Mater.* **2019**, 2, 2125.
[4] G. Lebreton, C. Géminard, F. Lapraz, S. Pyrpassopoulos, D. Cerezo, P. Spéder, E. M. Ostap, S. Noselli, *Science* **2018**, 362, 949.