Defined patches of interwoven materials

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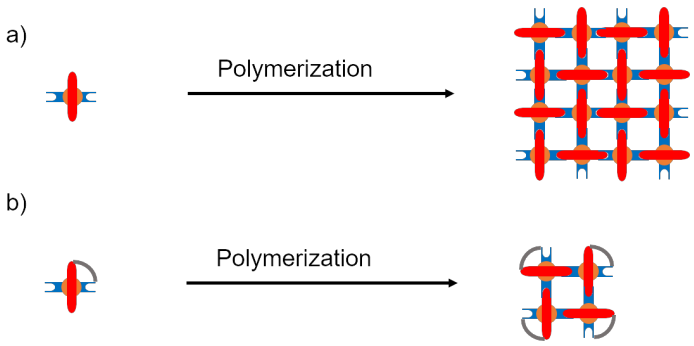
The simplest way of producing a textile is by orthogonally interlacing two yarns. The resulting material possesses stability, flexibility, and shape adaptability due to its interwoven structure. The concept of interwoven materials has been adapted to the molecular level in for example tailor-made DNA tiles, coordination polymers and tailor-made organic structures. [1]

A first step towards the bottom-up, self-assembled synthesis of polymer fabrics was done by Wöll *et al*. by designing textile sheets through pre-orienting the coupling partners to a MOF layer, reacting them, and then removing the metal ions to get the organic textile layer.[2]

We designed a heteroleptic, amphiphilic metal complex to take advantage of its pre-organization to assemble a molecular textile from bottom-up. The octahedral geometry of the metal complex and the rigidity of the tri-dentate ligands ensure angles in between the ligands of close to 90°. [3] By choosing amphiphilic ligands with different functional groups, which can be linked with each other, a moiety that can form an interwoven 2D material by polymerization was designed. Fixing the orientation of the monomer by using an water-air interface to orientate the hydrophilic ligand to the water allows us to have the necessary groups for the polymerization pre-organized in one plane to later form the 2D interlocked material.

In an effort to gain further insight into interwoven materials, we also designed a heteroleptic complex that can only interlink on two sides. To ease the separation of the possible enantiomers, a linker which is chiral itself was chosen. Polymerizing this restricted moiety, a defined patch of an interwoven material is formed. This defined patch would allow a variety of analytical measurements, which are not possible with the polymeric material, to give immense insight into this type of materials.



[1] A. Di Silvestro, M. Mayor, *Chimia*, **2019**, 73, 455-461.
[2] Z. Wang, A.Blaszczyk, O. Fuhr, S. Heissler, C. Wöll, M. Mayor, N*ature Comm.,* **2017**, 8, 14442.
[3] G. Harzmann, M. Neuburger, M.l Mayor, *Eur. J. Inorg. Chem.,* **2013**, 2013, 3334-3347.