SOCIÉTÉ CHIMIQUE DE GENÈVE

Self-Assembly, active self-disassembly, and evolution of a molecular motor

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Equilibrium self-assembly provides an important path for forming biological structures, for example, virus capsids or cytoskeletal filaments. This path is also employed for building artificial micro- and nanostructures with applications as biosensors or drug delivery systems, among others. However, equilibrium self-assembly is prone to also form undesired structures in addition to the desired targets.

I will discuss how active self-disassembly leads to a form of proofreading that can increase the yield of self-assembled target structures. I will show that filament treadmilling can be viewed as a combination of equilibrium self-assembly and active self-disassembly. Treadmilling is a process in which linear assemblies grow at one end and shrink at the same rate at the opposite end and plays an important role in bacterial and eukaryotic cells.

Finally, I will show how self-assembly and active self-disassembly can lead to the de novo evolution of a molecular motor.

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