From molecular motors to chemical engines

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How can we exploit the operating principles of molecular motors besides motion? Molecular motors can perform work. Therefore, mastering their operating principles can pave the way to energy-demanding (endergonic) processes, seemingly overcoming thermodynamic barriers.[1]

In this talk, experimental efforts will serve as a basis to discuss how energy can be exploited to drive molecular motion [2] and the assembly of high-energy nanostructures,[3] revealing common underlying principles.[4] I will take this opportunity to introduce myself to the Strasbourg chemistry community, presenting my research background and how it will evolve into future directions. The overarching goal of my group's research is contributing to unravel how energy sources can drive non-equilibrium processes at the molecular level.

Epitomic example. Suitably engineered monomers (middle) can spontaneously assemble into ordered low-energy structures (left). This process is now well controlled by chemists. On the other hand, exploiting an energy source to induce the assembly of an energy-demanding structure (right) is far from trivial. The talk will illustrate how the principles at the basis of molecular motion can be exploited to obtain high-energy assemblies and drive other non-equilibrium behaviors.

References:

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