Light on molecular machines

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The application of a bottom-up approach to the design, preparation and characterization of chemical systems that span from molecular scale devices and machines to bulk materials is a stimulating challenge of nanoscience [1]. The interest on this kind of systems arises from their ability to perform a (useful) function in response to chemical and/or physical stimulation. In this context, the use of light stimulation has several advantages, primarily because photons can be used to supply energy to the system (i.e., write) as well as to gain information about its state (i.e., read) [2]. Photochromic units, which undergo profound changes in their chemical and/or electronic structure upon optical excitation, are highly interesting for the construction of light responsive molecular architectures. In the seminar I will describe recent investigations undertaken in our laboratories, aimed at photo-inducing and -controlling large-amplitude molecular motions, both under thermodynamic and kinetic viewpoints, in multicomponent (supramolecular) species that comprise photoreactive elements [3]. Progress towards the construction of light driven molecular pumps [4] and molecular transporters (see Figure) [5] working in solution will be illustrated. We will also present a new class of photoswitchable materials for optoelectronic and gas storage applications [6].

References