

Double functional switching from photochromic molecules on surface

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Molecules can be switched between different states by different stimuli, including heating, light, and pH. Among these molecules, azobenzenes are excellent candidates as photochromic molecular switches since they can exist in two forms, the AZO-cis and the AZO-trans isomers. We introduce here two different molecules incorporating an azobenzene group as a central photochromic unit bridging two different terminal groups: bipyridine for the first [Bipy-Azo-Bipy] and terpyridine for the second [Tpy-Azo-Tpy]. The organizations of these molecules on a surface have been investigated by Scanning Tunneling Microscopy (STM). Both molecules self-assemble on surfaces and various supramolecular networks can be observed with a sub-molecular resolution, thanks to the intermolecular interactions of the terminals moieties. Hence, we studied by STM the different phase transitions induced by the protonation of the bipyridine terminal moieties and by the photo-switching of the photochromic central bridge. Indeed, a multiscale irreversible phase transition upon protonation was already observed on similar molecules consisting of a central bifluorene bridge and bipyridine terminal groups [Bipy-Fl-Bipy] [1-2]. Using [Bipy-Azo-Bipy], a similar, protonation induced, phase transition involving the switching from a cis-like to a trans-like isomer is also observed. Next we studied the effect of irradiation on the system. The photo-switching transition from the Azo-trans bridge to the Azo-cis can be triggered by UV light and reversed back to its initial state by visible light [3]. The photo-effect on the central photochromes was firstly confirmed in solution by UV-visible absorption spectroscopy and the organization of the Azo-cis isomers on surfaces will be presented [4].

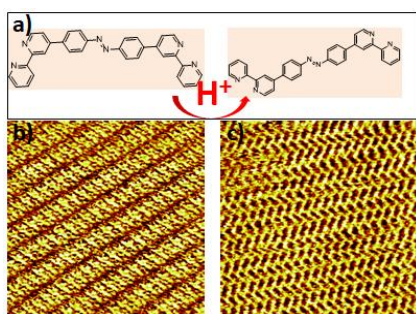


Figure1. a) Transition cis to trans. b),c) STM images 25x25 nm² of b) cis Bipy -Azo-Bipy structure at 1-octanol/HOPG interface and c) trans Bipy -Azo-Bipy structure at acid/1-octanol/HOPG interface.

Références

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