CONTROL OVER SURFACE WETTABILITY BY SURFACE-IMMOBILISED MOLECULAR MOTORS

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Harnessing work from molecular switches and motors is one of the key challenges in the development of future nanotechnologies as the random Brownian motion has to be overcome. The attachment of molecules on a surface is one approach to address this problem, while it also offers the possibility to alter the interface properties using external stimuli.[1]

Previous works employing overcrowded alkene-based molecular motors on a surface mainly focused on studying their rotary behaviour.[2] In addition, upon irradiation with light of surface-bound motors, a variation in water contact angle (WCA) could be achieved.[3] However, this observed change was rather small compared to the more explored controllable wetting of azobenzene or spiropyran functionalised surfaces.[4,5]

Here, we present a surface which exploits first-generation motors for this purpose. They are particularly interesting due to their exceptional thermal stability and superior photostationary state ratios with respect to previously used second-generation motors. Consequently, larger WCA variations are expected for systems based on functionalised first-generation motors (Figure 1). Incorporation of these motors in a mixed monolayer provides free space essential for the molecular motors to operate. The analysis of the self-assembled monolayers (SAMs) with X-ray photoelectron spectroscopy (XPS) and the changes in WCA upon irradiation are presented.

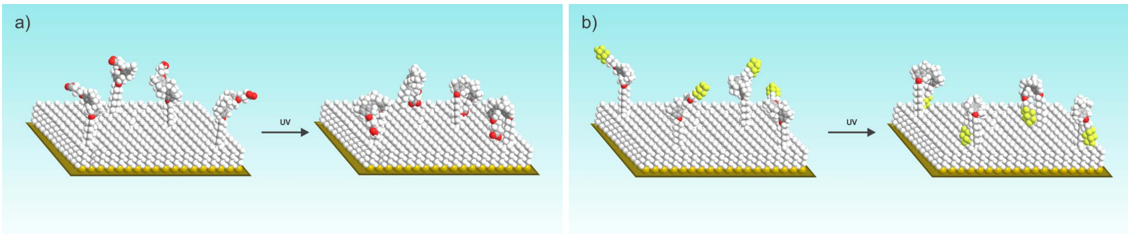

Figure 1. Schematic representations of photoswitching surfaces functionalised with (a) carboxylic acid motors and (b) perfluorinated motors.

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