LIGHT-RESPONSIVE π-CONJUGATED MACROCYCLES COMPRISING PHOTOCHROMIC UNITS

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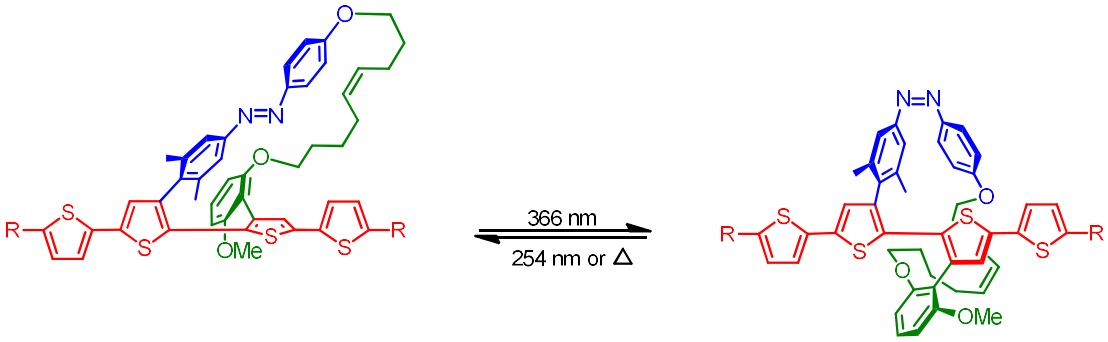
The tremendous effort has been made to develop photoresponsive molecular actuators applicable as active components in the various electronic devices ranging from computer circuits, optical memory storage devices to solar cells and field effect transistors [1,2]. Hitherto there are a few attempts in developing photochromic switches capable of alternating the length of π-conjugation in its backbone by changing its geometric conformation in response to light. Thus, it allows to modulate the optical properties by controlling the HOMO – LUMO gap. However, their photo-switching efficiency suffers due to the extension of π-conjugation in the system [2].

Herein we present Photochromic Torsional Switch (PTS) comprising azobenzene chromophores, which can reversibly undergo light-induced trans – cis isomerization. When connected to polythiophene scaffold, the switching event is accompanied by the conformational change of the macrocycle resulting in a planarized polythiophene moiety with an enhanced conjugation in the backbone. In order to switch it back to the initial state, either exposure to 254 nm light or thermal relaxation in the dark can be used, the latter being significantly slower. Such architectures are ought to permit the modulation of HOMO – LUMO gap to high extent [3]. Hence, various length π-conjugated photochromic switches obtained by regioselective palladium catalysed cross-coupling reactions allowed us to validate the concept of HOMO – LUMO gap reduction upon extension of conjugated system. In the future, this specific photochromic torsional switch may allow the development of novel optoelectronic devices.



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