Multichromophoric carbohydrates as fluorescent & reversible photoswitches for optical applications

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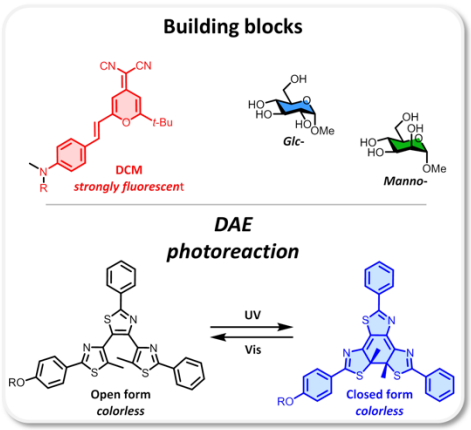
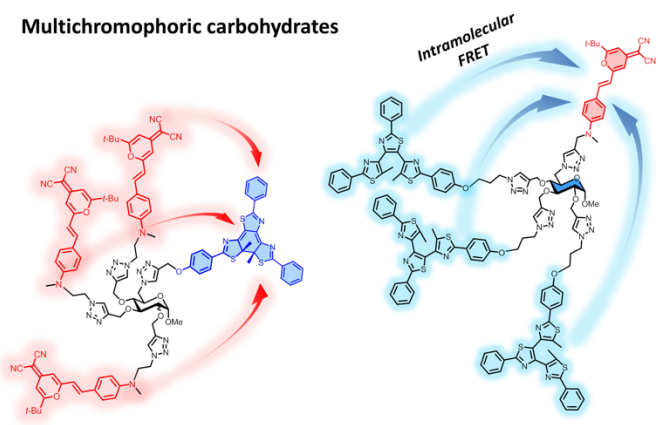
The development of photosensitive molecular systems attracts considerable interest in the growing fields of the photopharmacology and the photoresponsive nanotechnologies (optical memories and super-resolution imaging).[1],[2]

Because of their optical transparency and their structural diversity, carbohydrates appear as very interesting building blocks for the construction of novel photosensitive molecules bearing multichromophoric units. As a continuing program on the development of fluorescent photoswitchable molecules for biological and optical applications, we have designed and synthesized multichromophoric architectures based on carbohydrates derivatives.[3],[4]

To take advantage of the intramolecular energy transfer (FRET) possibilities between fluorophores and molecular photoswitches, we have combined photochromism of diarylethene (DAE) and fluorescence properties of dicyanomethylene (DCM) units on a single sugar unit. Thanks to the capability of DCM to photoisomerize as function of the wavelength of illumination,[5] we have discovered a new property: the fluorescent hysteresis effect. Hysteresis effect is very appealing for its fundamental aspects and can potentially find applications in "intelligent" molecular material. In order to caracterize it, the ratio of the linked chromophores (DAE/DCM) and the monosaccharidic platforms (glc- and manno-) were explored.

Synthesis of these photoswitchable multichromophoric carbohydrates as well as their photochemical and photophysical properties by absorption and fluorescence under light illumination will be presented.





Bibliographic references:

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