Title	Stimuli-responsive nanodevices
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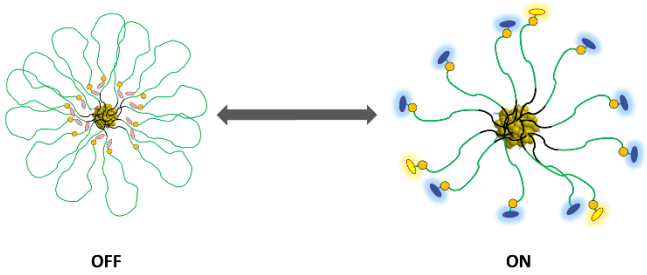
Project description:

The behaviour of nanodevices depend strongly on factors such as size and the physicochemical properties of their surface, which determine not only the behaviour but also the biological destiny of the nanoobjects. Indeed, in the 'nanodevice' of nature (the cell) the surface properties are fundamental for key processes such as embryonic development, adhesion, or viral and bacterial infections.

We are interested in developing a new class of stimuli-responsive nanodevices, able to mutate their surface properties in a transient and dynamic manner. The introduction of this feature will be fundamental for developing nanosystems that combine the required stealth properties towards the immune system[1] with the ability to switch-on their activity only in the presence of the desired triggers (light or chemical), thus solving one of the greatest dilemmas that limit the implementation of nanomedicine.



Stimuli-responsive nanodevices will be able to reversibly modify their surface upon specific stimuli (chemical or light). Applications in nanomedicine, in nanomachines development, or as fluorescent and ^{19}F-MRI probes will be exploited.

This approach will be also explored for developing an innovative class of fluorescence sensors or ^{19}F MRI probes capable of spatial resolution, which can be exploited for measurements in gel or tissue matrixes.

Furthermore, coupling the obtained knowledge with concepts of fuel consumption processes[2] will permit the development of nanomachines and innovative materials.

Competences and skills: organic synthesis, supramolecular chemistry, physical-organic chemistry, spectroscopy, catalysis, kinetics, light-activated molecules.

Possible hosting group for the period abroad:
Christopher A. Hunter, University of Cambridge, UK

References

1. *Chem*., **2017**, *3*, 92–109.
2. *Angew Chem. Int. Ed.*, **2021**, *60*, 20120-20143