CHEMICAL MODIFICATION OF FULLERENES USING "CLICK CHEMISTRY"

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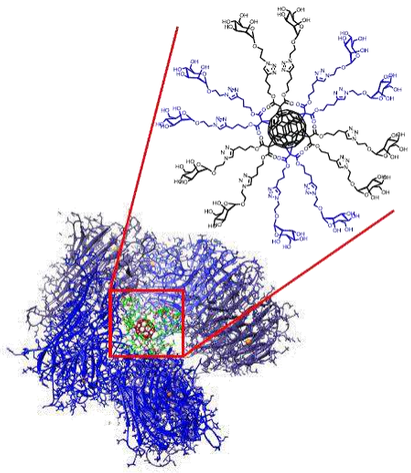
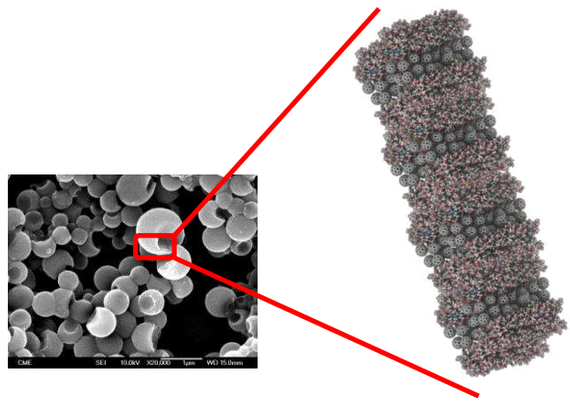
The unique phisycal and chemical properties of fullerenes have rendered them as very promising candidates in the development of two main scientific areas, bio-medical and materials science applications. The first research topic requires water-soluble fullerenes modified with biocompatible addends.[1] In the second field, the study of self-organization of fullerene derivatives to obtain functional supramolecular architectures is nowadays an important scientific challenge.[2] Through a convergent synthesis using the copper-mediated Huisgen 1,3-dipolar cycloaddition reaction (CuAAC), we can obtain different fullerenes and modulate their properties to provide them with specificity against a therapeutic target or modify their amphiphilic properties to control their self-assembly. For the latter purpose, we have prepared hexakis-adducts of fullerene with an octahedral addition pattern, in which the fullerene is functionalized with peripheral sugar moieties.[3,4]



The glycans are the ligands responsible to interact, in a multivalent manner, with cell surface receptors and start a cascade of processes that lead to cell attachment, fusion and entry of the virus into the target cells. Inspired by these events, we envisaged that a nanospherical scaffold covered by carbohydrates could constitute a reasonable mimic of the virus surface and therefore could be used to interact in a multivalent manner with cell surface receptors.

On the other hand, amphiphilic derivatives of C_{60} endowed with polar carboxylic acid groups have been prepared to study their aggregation behavior.



Interestingly, the morphology of the formed supramolecular architectures varies from wires to micelles or vesicles depending on the surface and on the concentration of the samples analyzed. This kind of aggregation could find applications on the design of new functional materials and in biological sciences.[5]

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