Conjugated Porous Polymer and Hybrid thereof Ground-Breaking Materials for Solar Energy Conversion

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Solar energy conversion plays an important role in the transition to more sustainable energy technologies. Both demographic growth and industrialization leads to an increase in the consumption of solid fuels which the consequent planet temperature rise and appearance of associated environmental problems. Thus, the development of new technologies to storage renewables energy is a matter of importance in the transition to a greener energy pool. In this sense, artificial photosynthesis (AP), which convert CO_2, and water as raw materials by the action of solar energy in valued chemicals or fuels, could be an attractive solution. Here, the look for new materials able to produce solar fuels as efficient manner is a challenge. Conjugated (micro)porous polymers (CMPs or CPPs) as well as their crystalline analogs Covalent Organic Framework (COFs) have appeared recently as alternative to inorganic semiconductor, metal oxides and chalcogenides, the typical photocatalyst used in AP. [1]

In this talk, I am going to show our last result in the use of CPPs and COFs as well as hybrid thereof in AP processes such as hydrogen production from water and CO_2 photoreduction. The first design key is the choice of the main structural moiety, fundamental to determine their performance. Here, CPPs based on truxenes[2], BODIPY[3], BOPHY[4] and phenanthrenequinone,[5] will be described as part of hybrid photocatalysis. The second key design is the nanostructuration of the polymer which lead to an improvement in the photocatalyst as well as allow the accessibility of thin films.[6] Finally it will be discussed the effect of the crystallinity over these systems. On the other hand, the elucidation of the charge transfer mechanism is really important to explain the photocatalytic results, and also will be explained.

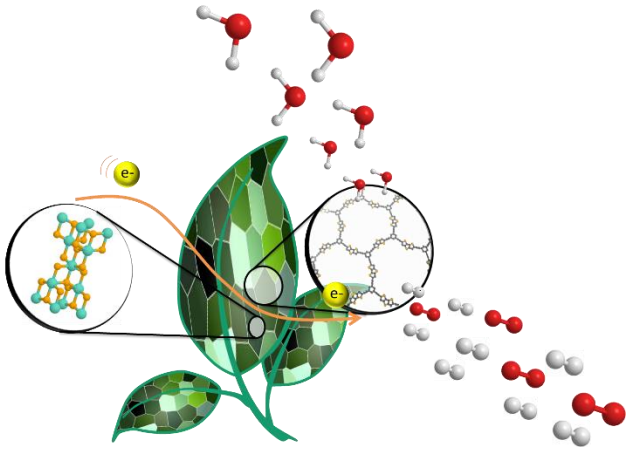

Figure 1. Cartoon describing an AP system based on CPPs and IS

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