MIMICKING PHOTOSYNTHESIS: APPLICATIONS TO MOLECULAR ELECTRONICS

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Photoinduced electron transfer processes have a great significance in nature since they govern photosynthesis in plants and bacteria. In this regard, during the last recent years the preparation of new artificial photosynthetic systems has been carried out as a fundamental task in chemistry. These artificial systems are constituted by electron-donor and electron-acceptor moieties chemically connected through different spacers. Light irradiation promotes an electron from the donor to the acceptor unit, giving rise to the formation of a *charge-separated state*.
Different types of electroactive organofullerenes [1] constituted by the C_{60} molecule as the acceptor fragment, and tetrathiafulvalene (TTF) or π-extended-TTF as well as π-conjugated systems as the donor moiety [2] will be presented [3]. These simple *artificial photosynthetic* models exhibit remarkable lifetimes (from *ns* to hundreds of *μs*), thus showing the importance of the gain of aromaticity and planarity as a concept to improve the lifetime of the charge separated states.

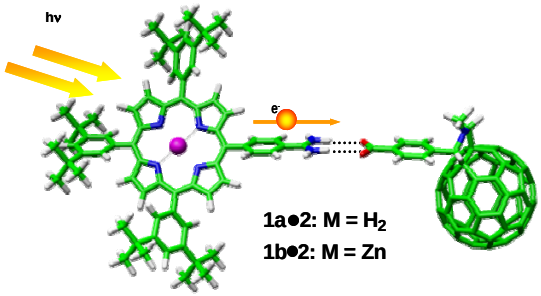

Figure 1. Photoinduced Electron Transfer Through H-Bonds in Porphyrin•C_{60} Pairs

Conceptually, an ideal molecular nanowire should resemble the features of a monodisperse π-conjugated oligomer, thus being promising candidates for electronic communication in the preparation of molecular electronic devices. Synthetic methodologies – mostly involving cross-coupling reactions – are powerful tools to fine-tune the requirements for exhibiting wire-like behaviour. Notably, we have recently succeeded in demonstrating this behavior in a series of oligo-*p*-phenylenevinylenes (oPPV) as well as oligo-*p*-phenyleneethynylenes (oPPE) bridges [3].
In this presentation, different types of electroactive organofullerenes constituted by the C_{60} molecule or a single wall carbon nanotube (SWNT) as the acceptor fragment, π-extended-TTF or ZnTPP as the donor moiety and π-conjugated oligomers as covalent spacers as well as H-bonding networks as non-covalent linkages will be discussed [4].

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