SolarBioCharges

Design and construction of bio-inspired chromophore-protein assemblies for efficient and sustainable solar-energy conversion to chargeseparation

Timeline | 12/20222 to 11/2024

ICIQ People | Elisabet Romero Research Group

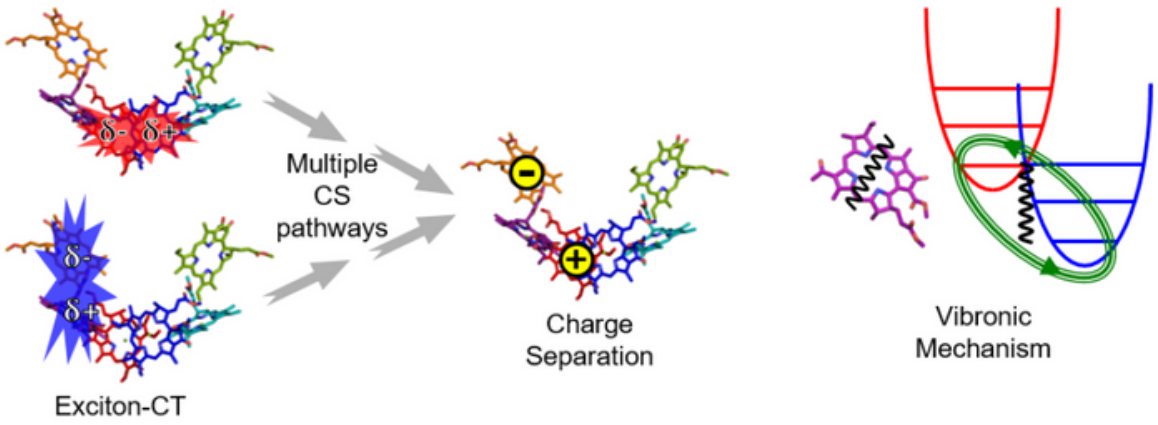
Budget | 189.750 €

Call | Proyectos estratégicos orientados a la Transición Ecológica y a la Transición Digital 2021

SUMMARY

The energy of the Sun is the most promising energy source to contribute to our society ecological transition and attain a more sustainable future, since it fulfils the requirements of being a renewable, widespread, safe and inexpensive energy supply. However, the sunlight that reaches the Earth needs to be transformed into a useful energy form for human consumption (for instance electricity or solar fuels). In this respect, three steps are required: solar-energy collection, transfer, and conversion. Once the energy is collected, it needs to be transferred to the site of energy conversion for the formation of a separation of charges; that is, an electron and a hole physically separated in space. The creation of this charge-separation is the essential step required to drive the generation of electricity (by connecting the chargeseparation system to electrodes to collect the charges) or to drive the production of fuels (by coupling the charge-separation system to catalysts to store the sunlight energy in the form of chemical bonds).

SolarBioCharges project aims to design and construct novel systems capable of absorbing solar energy and converting it into a stable separation of charges. To do so, the project will use a new generation of bio-inspired systems made of abundant and biodegradable materials based on the design principles of photosynthesis. To unravel the design principles of photosynthetic charge separation, a collection of steady-state and time-resolved spectroscopic techniques will be used, combined with theoretical modelling.



The Design Principles of Charge Separation

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