Excited

Engineering Excited States, Orbital Coupling and Quantum Coherence Phenomena in Photoelectrochemical Energy Conversion Devices

Timeline | 09/2023 to 08/2028

Budget | 2.500.000 €

ICIQ People | Palomares Research Group

https://cordis.europa.eu/project/id/101097684

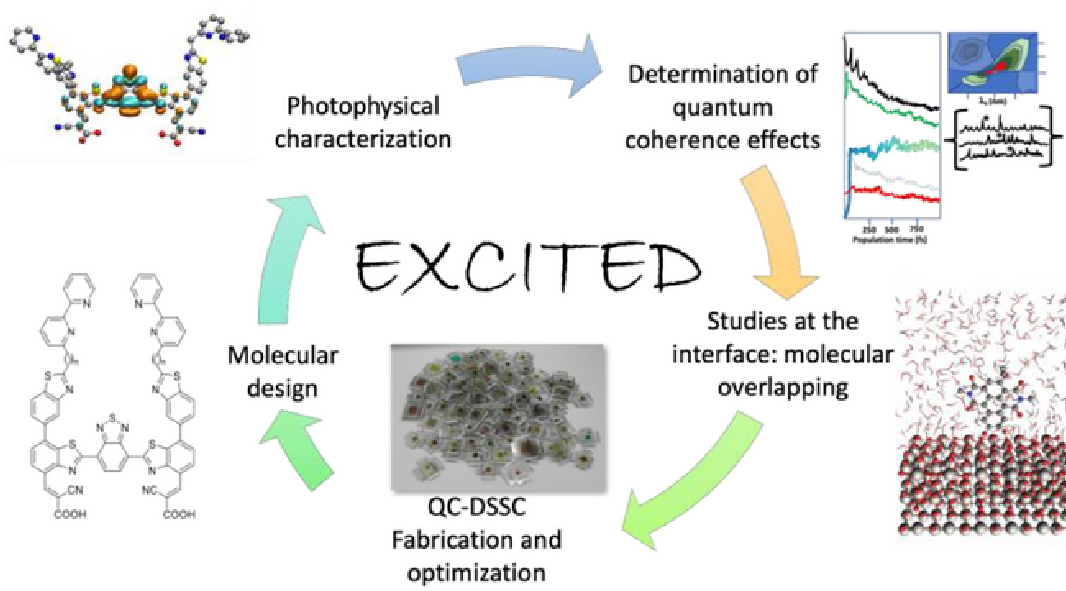
Call | ERC-2021-ADG

SUMMARY

Excited aims to advance fundamental understanding to light-initiated reactions in molecular sensitizers that can display quantum coherent behavior in their excited state dynamics at room temperature. Moreover, it will focus also on the investigation of quantum coherent contributions to the solar-to-energy conversion efficiency in solar cells.

Understanding the importance of quantum-coherent dynamics in biological systems has been key to assess whether this phenomenon is not just present but key for the control, and command, of the energy transport in molecular based systems. It is of utmost importance to validate models in which these quantum phenomena can be translated to materials that provide efficient solar to power conversion technologies.

Excited is not only a project where molecular solar cells will be fabricated and their physical properties will be measured. **Excited** goes well beyond that, and will pave the way for the development of solar cells that will be tailor-made to make use of quantum coherence, molecular hybridization and orbital coupling effects to increase the solar to energy conversion efficiency. It is clear that this challenge can only be successful under the scope of a multidisciplinary perspective open to new and feasible reasonable hypothesis. Therefore, I will make use of the research group knowledge on synthetic chemistry that has allowed us to obtain numerous sensitizers for solar cells applications, as well as, for semiconductor metal oxides. Moreover, I will take advantage of our experience in advanced experimental time-resolved techniques to study quantum coherent effects and solar cells under operando conditions. **Excited** will have a key impact on several fields, from biology to chemistry and physics and will bring paramount breakthroughs in the use of modified interfaces leading to the optimization of novel thin film solar cell technologies taking advantage of the quantum coherence phenomena and orbital coupling effects.



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