Phenanthrene-based Light-Harvesting Supramolecular Polymers for photoredox catalysis

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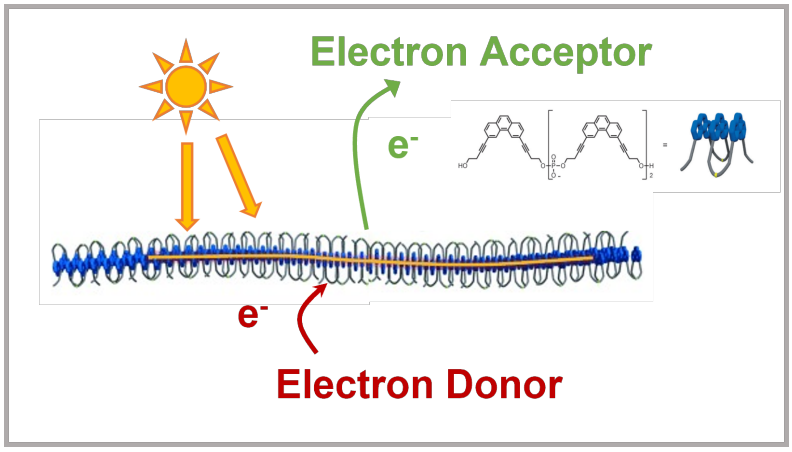
One promising approach to store the ubiquitous energy of the sun is to drive photoproduction of high energy fuels out of simple and abundant materials, such as water or CO_2. In natural photosynthetic systems, like green bacteria, this process is done via large self-standing supramolecular assemblies of chlorophyll molecules - the so-called chlorosomes - that funnel excitons toward a reaction center which itself initiates a redox cascade toward the fuel production.[1] Mimicking this extremely efficient machinery is a quest that chemists have been addressing over the last decades. One possible approach is molecular and associates an absorber (dye, quantum dots …) with a fuel production catalyst. If a huge amount of work has been dedicated to have more efficient catalysts for this technology,[2] less has been done to adapt the design of the absorber to a real antenna of chromophores. Light-harvesting Supramolecular Polymers (SPs) could enable to reach that goal and their integration into photoredox schemes is indeed a rather unexplored field of research.[3] Building on a strong expertise in SPs chemistry and photophysics,[4] we propose to address this issue. We will present first results regarding photoinduced electronic transfers between phenanthrene-based SPs and suitable redox active centers.



Photoinduced electronic transfers mediated by light-harvesting supramolecular phenanthrene polymer (in blue)

[1] Gert. T. Oostergetel, Herbert van Amerongen, Egbert. J. Boekema, *Photosynth Res,* **2010**, 104, 245.
[2] Marcos Gil-Sepulcre, Antoni Llobet, *Nat Catal,* **2022**, 5, 79.
[3] Oliver Dumele, Jiahao Chen, James V. Passarelli, Samuel I. Stupp*Advanced Materials,* **2020**, 32, 1907247.
[4] Christian B. Winiger, Shaoguang. Li, Ganesh R. Kumar, Simon Langenegger, Robert Häner, *Angewandte Chemie International Edition,* **2014**, 53, 13609.