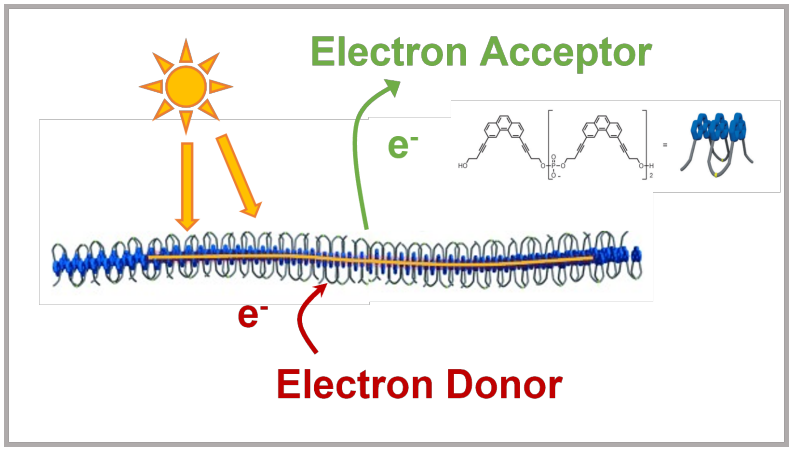
# Phenanthrene-based Light-Harvesting Supramolecular Polymers for photoredox catalysis

R. Brisse[1], A. Dutta[1], J. Réhaut[1], J. Jevric[1], I. Kolly[1], S. Langenegger[1], N. Banerji[1], P. Broekmann[1], S. Liu[1], R. Häner[1]*

[1]Department of Chemistry, Biochemistry and Pharmaceutical Sciences, University of Bern, CH-3012 Bern, Switzerland

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.