Design of photoenzyme materials based on light-activatable DNA-peptide supramolecular assemblies (extension)

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch Fortsetzungsanträge)

Bewilligung: 01.06.2021

Laufzeit: 3 Jahre

Artificial photosynthesis is one of the 'holy grails' pursued by scientists and engineers from multiple disciplines. Mimicking the ingenious capability of natural photosystems to convert light into high-energy electron transfer reactions and employing these for sustainable, yet economic chemical syntheses would open up entirely new dimensions for industrial processes that provide our society's needs, while preserving natural systems and resources. The project aims to design novel photoenzyme supramolecular materials, assembled from light-dependent electron transferring DNA components linked to redox enzyme mimics. Functional DNA scaffolds will be linked to peptides, through rationally designed miniaturized three-amino acid-peptide linkers. Atomic insights gained into hydrogenase structure-function relationships will thus employed to rationally design hydrogenase minimal peptides, which will then be peptide-tethered to DNA-photosensitizer modules. Both partner's expertise in electrochemical processes will furthermore be harnessed to couple DNA/peptide functional units to (photo-) electrodes, paving the way for a future integration of the designed catalytic materials into light- and water-powered electrodes.

Projektbeteiligte

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