

Protein photovoltaic





Overview

Can photosynthetic light harvesting and reaction centre proteins be used for solar energy?

Photosynthetic light harvesting and reaction centre proteins from both kingdoms have been exploited for solar energy conversion, solar fuel synthesis and sensing technologies, but the energy harvesting abilities of these devices are limited by each protein's individual palette of pigments.

Why are photosynthetic proteins attractive as device components?

Photosynthetic proteins are attractive as device components because they are environmentally sustainable and benign, they achieve solar energy conversion with a very high quantum efficiency (charges separated per photon absorbed) and they can be adapted to purpose through protein engineering.

Can a protein-based system simulate energy transfer between photosynthetic light-harvesting components?

We have engineered a protein-based system for simulating energy transfer between photosynthetic light-harvesting components.

Can a protein-based model mimic directional energy transfer between light-harvesting complexes?

We describe a protein-based model to mimic directional energy transfer between light-harvesting complexes using a circular permutant of the tobacco mosaic virus coat protein (cpTMV), which self-assembles into a 34-monomer hollow disk.

How productive are photovoltaic-driven SCP systems?

More specifically, this study sought to answer how productive photovoltaic-driven SCP (PV-SCP) systems can be in terms of calorie and protein production per unit time and land area in comparison to other SCP systems and to conventional crops, focusing on the effect that solar irradiance has on PV-SCP



yields.

Can a simplified photosynthetic reaction center protein improve energy conversion?

De novo development of a simplified photosynthetic reaction center protein can clarify practical engineering principles needed to build enzymes for efficient energy conversion. Here, the authors develop an artificial photosynthetic reaction center that functions without the need for sacrificial electron donors or acceptors.



Protein photovoltaic



Photosynthetic Protein Complexes as Bio-photovoltaic Building ...

Photosynthetic compounds have been a paradigm for biosolar cells and biosensors and for application in photovoltaic and photocatalytic devices. However, the interconnection of proteins and protein complexes with electrodes, in terms of electronic contact, structure, alignment and orientation, remains a challenge. Here we report on a deposition ...

Fullerenes for Bioscience & Photovoltaic Applications

Fullerenes in Photovoltaics Fullerenes have an extremely low reorganization energy following electron transfer, a property that makes them one of the most useful electron acceptor molecules in organic electronics. 4 They are also n-type semiconductors (with band gap = 2.3eV), making them a good counterpart to the numerous good p-type organic semiconductors.



Spectroscopic, quantum mechanical studies, ligand protein ...

This section elaborates the molecular modeling procedure in detail. Three-dimensional (3D) structure of Cyclooxygenase 1 (COX1) was retrieved by Protein Data Bank (Berman et al. 2000). The atomic coordinates of sheep (ovisaries) Cyclooxygenase 1 (COX1) was chosen with 2.85 Å X-ray crystallization resolution values and an inhibitor (S-alpha-substituted ...



Photoelectrochemical Complexes of Fucoxanthin-Chlorophyll Protein ...



Open-circuit photovoltage (V_{oc}) is among the critical parameters for achieving an efficient light-to-charge conversion in existing solar photovoltaic devices. Natural photosynthesis exploits light-harvesting chlorophyll (Chl) protein complexes to transfer sunlight energy efficiently. We ...



Photovoltaic-driven microbial protein production can use land and

Photovoltaic-driven microbial protein production can use land and sunlight more efficiently than conventional crops. / Leger, Dorian; Matassa, Silvio; Noor, Elad et al. In: Proceedings of the National Academy of Sciences of the United States of America, ...

Competition between intra-protein charge recombination and ...

Competition between intra-protein charge recombination and electron transfer outside photosystem I complexes used for photovoltaic applications Alice Goyal¹ · Sebastian Szewczyk¹ · Gotard Burdzinski¹ · Mateusz Abram^{2,3} · Joanna Kargul² · 1



Lateral Photovoltaic Effect in Silk-Protein-Based Nanocomposite

Lateral Photovoltaic Effect in Silk-Protein-Based Nanocomposite Structure for Physically Transient Position-Sensitive Detectors May 2021 Physical Review Applied 15(5) DOI: 10.1103/PhysRevApplied



electrochemical cells (PEC) containing ...



Photovoltaic-driven microbial protein production can use land and

When expressed on a per unit protein basis, these production costs are about \$4 to \$5 per kg-protein, which reveals costs higher than the market price of fishmeal (?\$2.5 per kg-protein) and soybean meal (?\$1 per kg-protein) (SI Appendix, Table S1).



Photovoltaic-driven microbial protein production can use land and

Photovoltaic-driven microbial protein production can use land and sunlight more efficiently than conventional crops Dorian Legera,¹ Silvio Matassab, Elad Noorc, Alon Shepond,e, Ron Miloc, and Arren Bar-Evena aSystems and Synthetic Metabolism, Max Planck Institute of Molecular Plant Physiology, 14476 Potsdam, Germany; bDepartment of Civil, Architectural and

Next Generation Designed Protein as a Photosensitizer for

Protein Purification, Quantification, and Fluorescence Analysis. The soluble proteins were purified using Ni-NTA HisBind Resin (Novagen). Accordingly, the protein samples were equilibrated with



Polychromatic solar energy conversion in pigment-protein

Photosynthetic proteins are attractive as device components because they are environmentally sustainable and benign, they achieve solar energy conversion with a very high ...



Photosynthetic Protein Complexes as Bio-photovoltaic Building ...

Photosynthetic compounds have been a paradigm for biosolar cells and biosensors and for application in photovoltaic and photocatalytic devices. However, the ...



Photovoltaic-driven microbial protein production can use land and

Microbial biomass can be cultivated to yield protein-rich feed and food supplements, collectively termed single-cell protein (SCP). Yet, we still lack a quantitative comparison between ...



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De novo protein design of photochemical reaction centers

Natural photosynthetic protein complexes capture sunlight to power the energetic catalysis that supports life on Earth. Yet these natural protein structures carry an ...



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- Intelligent Integration**
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Photovoltaic-driven microbial protein production can use land and

Photovoltaic-driven microbial protein production can use land and sunlight more efficiently than conventional crops Proceedings of the National Academy of Sciences Vol. 118 No. 26 \$10.00 Add to Cart Restore content access Restore content access for Media

Biophotovoltaics: Recent advances and perspectives

Biophotovoltaics (BPV) is a clean power generation technology that uses self-renewing photosynthetic microorganisms to capture solar energy and generate electrical ...



Spectroscopic, quantum mechanical studies, ligand protein ...

DOI: 10.1007/s11696-019-01047-7 Corpus ID: 209540783 Spectroscopic, quantum mechanical studies, ligand protein interactions and photovoltaic efficiency modeling of some bioactive benzothiazolinone acetamide analogs @article{Mary2020SpectroscopicQM



Photoelectrochemical Complexes of ...

We describe the exploitation of photosynthetic fucoxanthin-chlorophyll protein (FCP) complexes for realizing photoelectrochemical cells with a high Voc. An antenna-dependent photocurrent response and a Voc up to ...



The Human Protein Atlas

The atlas for all human proteins in cells and tissues using various omics: antibody-based imaging, transcriptomics, MS-based proteomics, and systems biology. Sections include the Tissue, Brain, Single Cell Type, Tissue Cell Type, Pathology, Disease Blood Atlas

Protein (nutrient)

Colour key: Protein source with highest density of respective amino acid. Protein source with lowest density of respective amino acid. Protein milkshakes, made from protein powder (center) and milk (left), are a common bodybuilding supplement Protein powders - such as casein, whey, egg, rice, soy and cricket flour- are processed and manufactured sources of protein.



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Polychromatic solar energy conversion in pigment-protein

the energy harvesting abilities of these devices are limited by each protein's individual strategies for use of Photosystem I for sustainable photovoltaic energy conversion . Biochim



The anabolic response to protein ingestion during recovery from

Trommelen et al. investigate the anabolic response to the ingestion of various amounts of protein following exercise and demonstrate a dose-response increase in the magnitude and duration of protein absorption, muscle protein synthesis rates, and whole-body net protein balance. The anabolic response to protein ingestion has no upper limit.



Protein-Based Model for Energy Transfer between ...

We describe a protein-based model to mimic directional energy transfer between light-harvesting complexes using a circular permutant of the tobacco mosaic virus coat protein (cpTMV), which self-assembles into a 34 ...

A genetically encoded photosensitizer protein facilitates the rational

A 27 kDa photosensitizer protein (PSP) has now been developed and used to design a miniature photocatalytic CO2-reducing enzyme. Visible light drives the PSP efficiently to the long-lived triplet



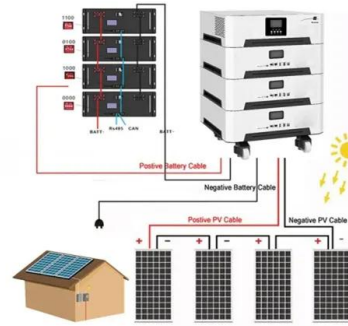
Photovoltaic-driven microbial protein production can use land and

DOI: 10.1073/pnas.2015025118 Corpus ID: 235595143 Photovoltaic-driven microbial protein production can use land and sunlight more efficiently than conventional crops @article{Leger2021PhotovoltaicdrivenMP, title={Photovoltaic-driven microbial protein production



Photovoltaic-driven microbial protein production can use land and

Microbial biomass can be cultivated to yield protein-rich feed and food supplements, collectively termed single-cell protein (SCP). Yet, we still lack a quantitative comparison between traditional agriculture and photovoltaic-driven SCP systems in terms of land use



Photovoltaic-driven microbial pro preview & related info

Photovoltaic-driven microbial protein production can use land and sunlight more efficiently than conventional crops Leger D Matassa S Noor E et al. See more Proceedings of the National Academy of Sciences of the United States of America (2021) 118(26) DOI:

Competition between intra-protein charge recombination and ...

Competition between intra-protein charge recombination and electron transfer outside photosystem I complexes used for photovoltaic applications Photochem Photobiol Sci. 2022 Mar;21(3):319-336. doi: 10.1007/s43630-022-00170-x. Epub 2022 Feb,



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