Bio-solar cell power generation

What is a whole-cell Biophotovoltaic system?

Whole-cell biophotovoltaic systems (BPVs) are a renewable,non-polluting energy-generating devicethat utilizes oxygenic photosynthetic microbes (OPMs) to split water molecules and generate bioelectricity under the driving of light energy.

Can Biophotovoltaic systems generate electricity?

The research revealed that biophotovoltaic systems can generate electricitywithout significantly impacting the organisms' core functions. The addition of ferricyanide as a mediator helped facilitate electron transfer while competing with natural electron-consuming processes,particularly the flavodiiron proteins.

What is solar energy?

Solar energy is an infinite energy reservoir,which radiates the earth's surface at an annual rate of 120,000 TW (Blankenship et al.,2011; Lewis and Nocera,2006).

How do photosynthetic microorganisms use solar energy?

Photosynthetic microorganisms use solar energy to fix carbon dioxide into organic matters,e.g. lactate and sucrose. These organic matters serve as the energy carriers to be consumed and oxidized anaerobically by electroactive bacteria for electricity generation. The diagrams showed in (A) and (B) are the cell topology of cyanobacterial cell.

Bio-photovoltaic cells represent a burgeoning platform for sustainable energy conversion, leveraging photosynthetic electron transport for bioelectricity generation. However, the inherent ...

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

The development of carbon-neutral fuel sources is an essential step in addressing the global fossil energy crisis. Whole-cell biophotovoltaic systems (BPVs) are a renewable, non-polluting ...

Here, we report an entirely self-sustainable and scalable microliter-sized bio-solar cell with significant power enhancement by maximizing solar energy capture, bacterial attachment, and ...

In the present study, we developed a new generation polydimethylsiloxane (PDMS) based microfluidic chamber integrated with a BPV cell which is a pioneering attempt to establish a 3D biofilm formation ...

PV cells are usually sensitive to a portion of the solar spectrum (e.g. 300-1100 nm for single-junction Si cells), with only 10-25% of the incident solar energy converted into electricity by ...

The growing global energy demand and the limitations of fossil fuels which are polluting, costly, geographically restricted, and non-renewable, have prompted the exploration of sustainable ...

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Biophotovoltaic systems (BPVs) resemble microbial fuel cells, but utilise oxygenic photosynthetic microorganisms associated with an anode to generate an extracellular electrical ...

Systems Biotechnology, Department of Solar Materials, Helmholtz Centre for Environmental Research, Leipzig, Germany Biophotovoltaics is a relatively new discipline in ...

LEIPZIG, Germany -- What if the next revolution in solar power came not from high-tech silicon panels, but from some of Earth"s smallest inhabitants? Scientists have discovered that ...

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