

What is solar-driven ionic power generation?

We herein report a new technology of "solar-driven ionic power generation" based on ionic thermophoresis and electrokinetic effects that could convert solar energy into electricity by using a film of nanocellulose @conductive metal-organic framework.

What is ion-implantation in photovoltaic cells?

Ion-implantation in photovoltaic (PV) cells attracted the attention of investigators because of its ability to implant the required metal ions into the substrate layers with the advantage of controlling the location and the composition to acquire high performance by allowing the multi-stage transition of electrons.

How does ion pumping work in solar energy harvesting & storage?

Either way, electrochemical gradients are formed after light-induced ion pumping process and are utilized to power various biological processes. In brief, active ion transport against a concentration gradient across a cell wall, which is operated by ion pump, is the key point for this "ionic" mode of solar energy harvesting and storage.

When did ion-implanted solar cells come out?

In 1964 on the 4th IEEE PVSC, King et al. reported ion-implanted silicon solar cells by using Van de Graff electrostatic accelerator for the acceleration of boron or phosphorus ions and these ions were generated with the help of a microwave ion source .

Are internal nanochannels a key factor for efficient solar-driven ionic power generation?

Accordingly, the equivalent circuit is obtained (Fig. S10). From these results, it is concluded that the elaborate design of internal nanochannels and full use of external driving forces are key factors for achieving efficient solar-driven ionic power generation [33,34].

How ion implantation & irradiation affect the efficiency of solar panels?

Solar panels are also used in the space, where a large variety of the irradiation/dose can affect their working and efficiencies. Hence, the effect of ion-implantation or the irradiations should enhance the efficiency rather than spoiling it.

Renewable energy plays a significant role in achieving energy savings and emission reduction. As a sustainable and environmental friendly renewable energy power technology, concentrated solar power (CSP) integrates power generation and energy storage to ensure the smooth operation of the power system. However, the cost of CSP is an obstacle hampering the commercialization ...

In this featured letter, the photovoltaic applications of ion-implantation and their effects in the enhancement of power conversion efficiency in addition to the enhanced lifetime ...

Solar energy generation is a sunrise industry just beginning to develop. With the widespread application of new materials, solar power generation holds great promise with enormous room for innovation to improve efficiency conversion, reduce generating costs and achieve large-scale commercial application. Many countries hold this innovative technology in high regard, with a ...

This paper describes a freestanding hybrid film composed of a conductive metal-organic framework layered on cellulose nanofibres which enables efficient solar power generation. The working principle, which is different from the ...

In this featured letter, the photovoltaic applications of ion-implantation and their effects in the enhancement of power conversion efficiency in addition to the enhanced lifetime of solar cells have been discussed. Ion-implantation is the most accurate, progressive and advanced doping technology for the modification of material's surface ...

We herein report a new technology of "solar-driven ionic power generation" based on ionic thermophoresis and electrokinetic effects that could convert solar energy into electricity by using a film of nanocellulose @ conductive metal-organic framework. The hybrid film enables the formation of a large thermal gradient on the ...

For the ion passive transport for harvesting salinity gradient energy, the specific features and power density of 1D/2D/3D nanofluidics are summarized. For the ion active transport for solar energy generation, three preliminary approaches and their derived concepts, including pseudo-ion pump/physical ion pump/chemical ion pump, are proposed ...

Hydrovoltaic electricity generators (HEGs), powered by ubiquitous water evaporation, are emerging due to their high spontaneity and continuity. However, the current performance of most HEGs is restricted to 50.00 $\mu\text{A cm}^{-2}$, far from commercial applications. Herein, we propose an ion-engine HEG by establishing

Ionovoltaics is a breakthrough concept in energy conversion that harnesses water motion with ion dynamics to generate electrical energy. This phenomenon is based on the interaction between the nanoscopic ionic behavior at the solid-liquid interface and the flow of electrons in a semiconductor electrode. Ionovoltaic research aims to ...

Solar energy fits well with the increasing demand for clean sustainable energy. This paper describes a freestanding hybrid film composed of a conductive metal-organic framework layered on...

The promotion of PV power generation based on solar energy can increase the proportion of clean energy in the energy structure of China. China is rich in solar energy resources, and the highest Global Horizontal Irradiation (GHI) in China can reach about 2300 Kwh/m^2 [4], but it is not until the past decade that solar energy in China has gradually begun ...

Distributed solar power generation can enhance grid stability by reducing the need for centralized power plants and long distance transmission lines. Solar energy systems are scalable and adaptable to various needs from small installations to large utility scale solar farms . Ongoing research and development in solar technology continue to drive advancements, ...

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Further, solar energy sector in India has emerged as a significant player in the grid connected power generation capacity over the years. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy security. National Institute of Solar Energy (NISE) has assessed ...

Concentrated solar power (CSP) uses mirrors to concentrate solar rays. These rays heat fluid, which creates steam to drive a turbine and generate electricity. CSP is used to generate electricity in large-scale power plants. By the end of 2020, the global installed capacity of CSP was approaching 7 GW, a fivefold increase between 2010 and 2020. It is likely that some 150 MW ...

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