High-efficiency solar power generation device

A solar-to-hydrogen device-level efficiency of greater than 20% at an H2 production rate of >2.0 kW (>0.8 g min-1) is achieved. ... pilot plant capable of co-generation of hydrogen and heat. A ...

The conversion of sunlight into electricity has been dominated by photovoltaic and solar thermal power generation. A highly efficient solar to electric energy conversion device based on ...

The DSC achieves an external quantum efficiency for photocurrent generation that exceeds 90% across the whole visible domain from 400 to 650 nm, and achieves power outputs of 15.6 and 88.5 mW cm ...

The efficiency of a photovoltaic (PV) system strongly depends on the transformation process from solar energy to electricity, where maximum power point tracking (MPPT) is widely regarded as a promising technology to harvest solar energy in the first step. Furthermore, inverters are an essential part of solar power generation systems. Their ...

Here, an integrated device that achieves unprecedented power density up to 1.1 W m -2 with excellent stability through a salinity concentration gradient induced by solar ...

Power generation device via solar collector coupled with a shape-memory alloy thermo-mechanical switch utilizing MXene nanofluid as high-efficiency photothermal conversion working medium. Author links open overlay panel Yang Zhou a, Wei Yu a b, Yifan Li a b, Qiuxing Lei a, Huaqing Xie a b. Show more.

As predicted in Fig. 1 (c), c-Si heterojunction solar cells with passivating contacts will be the next generation high-efficiency PV production (>= 25%) after PERC. This article reviews the recent development of high-efficiency Si heterojunction solar cells based on different passivating contact technologies, from materials to devices.

Organic/inorganic metal halide perovskites attract substantial attention as key materials for next-generation photovoltaic technologies due to their potential for low cost, high performance, and ...

Future work is planned to improve the EU and CEC weighted efficiency to >98.5%, such as reported for high cost PV inverter prototypes that use SiC MOSFET and SiC diode power devices [20, 21]. The planned ...

Renewable energy-based power generation capacity is estimated to be 128 GW in 2014, of which 37% is wind power, almost one third solar power, and more than a quarter from hydropower (Fig. 1 a). This amounted to more than 45% of world power generation capacity additions in 2014, consistent with the general upward trend in recent years.

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High-efficiency and low-cost thermal management approaches for PV panels are of great significance in this context, as these would allow significantly enhanced power generation of dozens of GW ...

With the increasingly advanced high-efficiency strategy, the interface solar-driven steam generation system"s performance is rapidly improving. This review discusses this system"s latest developments in various high-efficiency strategies from three perspectives: light absorption, heat utilization, and water and salt control.

Here we develop a methodology to understand the theoretical limits and optimum design of a hybrid CPV/T converter that includes both a high- and low-energy conversion cutoff. By investigating how the limiting efficiency is related to the spectral bandwidth illuminating the PV converter, we explain how the highest performing device indeed minimizes the overall ...

Water-flow-induced high-efficiency solar vapor generation and electricity collection. Author links open overlay panel Jingrui Lan a, Wenpeng Hong a, Haoran Li a b, Shiming Wang a, Changyuan Dong a, Yan Li a. ... The synchronized evaporation-power generation device was placed on a precision electronic balance (PRACTUM313-1CN, ...

Specifically, a sophisticated power generation device combining a solar collector and an SMA-based thermo-mechanical switch is introduced. This system incorporates two photothermal conversion components: a DASC and a vacuum tube solar collector (VTSC). The power generation unit employs an SMA engine as the photothermal power generator converter.

Although photothermal electric power generation can show a solar-to-electricity conversion efficiency exceeding 7% under 38 Sun, ... Under 0.8 Sun, the device gained a high responsivity of 176.9 V W -1 with a long response-recovery time of about 80 s ... it is very difficult to achieve high solar conversion efficiency, which has been a ...

Solar energy is a green, stable and universal source of renewable energy, with wide spectrum and broad area characteristics [1] is regarded as being one of the renewable energy sources with the greatest potential to achieve sustained, high intensity energy output [1], [2].The conflict between population growth and water shortage has become one of the most ...

The power generation measurement used the solar vapor evaporation device to supplement wind energy and other modules to simulate marine environment (21.4 °C, 15.8% RH, winter, in Harbin, China).

But perovskites have stumbled when it comes to actual deployment. Silicon solar cells can last for decades. Few perovskite tandem panels have even been tested outside. The electrochemical makeup ...

In recent years, solar water evaporation system by utilizing wood-based photothermal material has drawn a lot

of attention and displayed promising practical application prospect. However, challenges still remain in terms of its relatively low efficiency. Here, a facile, cost-efficient, and scalable method was proposed to prepare porous silicon loaded wood ...

In contrast to the low-temperature solar devices, high-temperature solar systems achieve temperatures beyond 250 °C and can go up to 3000 °C or more by using concentrating collectors in the path of solar radiation. ... Solar energy towers are considered good prospects due to their high efficiency and production of low-cost electricity in the ...

Since the first report on 9.7% efficient solid-state perovskite solar cell (PSC) in 2012, perovskite photovoltaics received tremendous attentions. Efforts to increase power conversion efficiency (PCE) have been continuously made. As a result, a record PCE of 25.2% was certified in 2019, which surpassed those achieved from the conventional solar cells based ...

The semiconductor thermoelectric power generation, based on the Seebeck effect, has very interesting capabilities with respect to conventional power generation systems. During the1990s, there was a heightened interest in the field of thermoelectric which was largely driven by the need for more efficient materials for power generation.

Besides high efficiency, revenue and output are of significant worth for cost-effective flexible CIGS modules. ... The solar cell efficiency represents the amount of sunlight energy that is transformed to electricity through a photovoltaic cell. ... The maximum power generation of 11.77 W and 2.61 W was reached in PV modules and thermoelectric ...

A high-efficiency solar desalination ... H. & Liu, Y. A droplet-based electricity generator with high instantaneous power density. ... efficiency in polymer solar cells using an inverted device ...