Butterfly-shaped solar semiconductor power generation

Are semiconductors used in solar energy conversion based on photovoltaics?
Nature Communications 12,Article number: 4622 (2021) Cite this article Semiconductors have been used in solar energy conversion for decadesbased on the photovoltaic effect. An important challenge of photovoltaics is the undesired heat generated within the device.

What are photothermal conversions of solar energy?
Then, the state-of-the-art progress for photothermal conversions of solar energy is introduced in detail, mainly including photothermal water evaporation and desalination, photothermal catalysis, photothermal electric power generation, photothermal bacterial killing, photothermal sensors, and photothermal deicing.

Could a butterfly make solar panels more efficient?
The wings of a butterfly have inspired a new type of solar cell that can harvest light twice as efficiently as before and could one day improve our solar panels. Solar panels are usually made of thick solar cells,and are positioned at an angle to get the most amount of light from the sun as it moves throughout the day.

Could a black butterfly improve solar cell performance?
Scientists from KIT and Caltech utilize the disordered nanoholes of the black butterfly to improve solar cell performance. The wings of a butterfly have inspired a new type of solar cell that can harvest light twice as efficiently as before and could one day improve our solar panels.

How do semiconductors convert solar energy into heat?
Semiconducting materials convert solar energy into heat by absorbing the photon energy larger than their bandgaps,so that electrons in the valence band (VB) are able to be excited to the conductive band (CB). Next,excitation-state electrons and holes are produced in the CB and VB,respectively.

What is the efficiency of silicon heterojunction solar cells?
Sai,H.,Umishio,H. &Matsui,T. Very thin (56 mm) silicon heterojunction solar cells with an efficiency of 23.3%and an open-circuit voltage of 754 mV. Sol. RRL5,21000634 (2021). Article Google Scholar Sun,Y. et al. Flexible organic solar cells: progress and challenges. Small Sci.1,2100001 (2021).

This paper presents a novel design scheme to reshape the solar panel configuration and hence improve power generation efficiency via changing the traditional PVpanel arrangement. Compared to the standard PV arrangement, ...

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herein showcase a series of novel butterfly-shaped OSCs by contorting the pentacenone/anthrone cores with steric substitutions, which brings higher power factors up to 312 mWm1 K 2 for ...

This thesis is dedicated to extensive studies on e cient and stable power generation by solar photovoltaic (PV) technologies. The three major original contributions reported in this thesis ...

semiconductor devices that convert electrical energy directly into light. They are widely used in lighting, display panels, and indicators, offering significant energy savings compared to ...

Recently, the research team of Prof. Zhu Chengjun with the School of Physical Science and Technology has made important progress in the research of fiber-shaped integrated devices. ...

Although photothermal electric power generation can show a solar-to-electricity conversion efficiency exceeding 7% under 38 Sun, ... engineering including vacancies and doping can be adopted to produce defect ...

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