

What is photothermal phase change energy storage?

To meet the demands of the global energy transition, photothermal phase change energy storage materials have emerged as an innovative solution. These materials, utilizing various photothermal conversion carriers, can passively store energy and respond to changes in light exposure, thereby enhancing the efficiency of energy systems.

How do photothermal materials optimize solar energy utilization?

To optimize solar energy utilization, photothermal materials are engineered to maximize incident solar radiation absorption, while minimizing losses due to transmission and reflection. Furthermore, these materials are designed to convert absorbed photon energy into thermal energy efficiently.

How to improve thermal management in photothermal conversion systems?

Effective thermal management is essential in enhancing the efficiency of photothermal conversion systems, which convert solar energy into thermal energy. Here, we discuss strategies to improve thermal management by focusing on insulation, heat transfer mechanisms, and materials selection.

What are the applications of photothermal materials?

Explore the broad spectrum of applications for photothermal materials, including their transformative roles in photothermal catalysis, sterilization and therapy, desalination, and the generation of electric energy through photothermal conversion.

Can photochemical energy and photothermal energy be stored together?

For the solar-chemical-thermal fuel application, the solar spectra should be rationally split for simultaneous storage of the photochemical energy and photothermal energy. The emerging photoswitchable PCMs could attract interdisciplinary efforts from chemistry, material science, and energy engineering.

Can photothermal materials revolutionize information storage?

Looking ahead, the potential applications of photothermal materials extend beyond their current mainstream uses. These materials, responsive to light-induced temperature changes, are poised to revolutionize sectors like sensing and actuation, as well as information storage.

In addition, there are photothermal power generation and photothermal energy storage device design (Figure 1C). 14, 17, 18 Particularly, intensive attempts and strategies have been devoted to realizing photothermal industrialization. Large-scale and highly concentrated solar systems, ...

In fact, researchers are very familiar with the photothermal effect of sunlight, such as in the application of solar water heaters. In addition, there are photothermal power generation and photothermal energy storage

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1 INTRODUCTION. Renewable, abundant, and clean solar energy is expected to replace fossil fuels and alleviate the energy crisis. However, intermittency and instability are the deficiencies of solar energy due to its weather and space dependence. [] Emerging phase change material (PCM)-based photothermal conversion and storage technology is an effective ...

of photothermal catalysis Chuqiao Song, 1Zhaohua Wang, Zhen Yin,2,\* Dequan Xiao,3,\*and Ding Ma  
SUMMARY Solar energy provides an alternative, sustainable, and clean source of energy to meet the global energy demands without extra carbon emissions. However, the utilization efficiency of sunlight via most

Photothermal materials with energy-storage properties provide an energy-saving design for highly efficient anti-icing/deicing applications Special Collection: ... (MP@PPCM) is prepared via salt-template and melt-blending methods. Owing to the synergistic effect of the latent heat released from the phase change material and the thermal ...

2D MXene is highly preferred for photothermal energy conversion and microwave absorption. However, the aggregation issue, insufficient dielectric loss capacity, and lack of magnetic loss capacity for MXene severely hinder its practical applications. Herein, the authors propose multi-dimensional nanostructure engineering to electrostatically assemble 2D ...

Phase change materials (PCMs), both organic and inorganic, store and release energy through a phase change process, which is the green carrier for maintaining or prolonging heat [[5], [6], [7]]. A large number of studies have proved that PCMs is conducive to improving the utilization rate of solar energy as solving the shortcomings of solar energy time and space ...

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