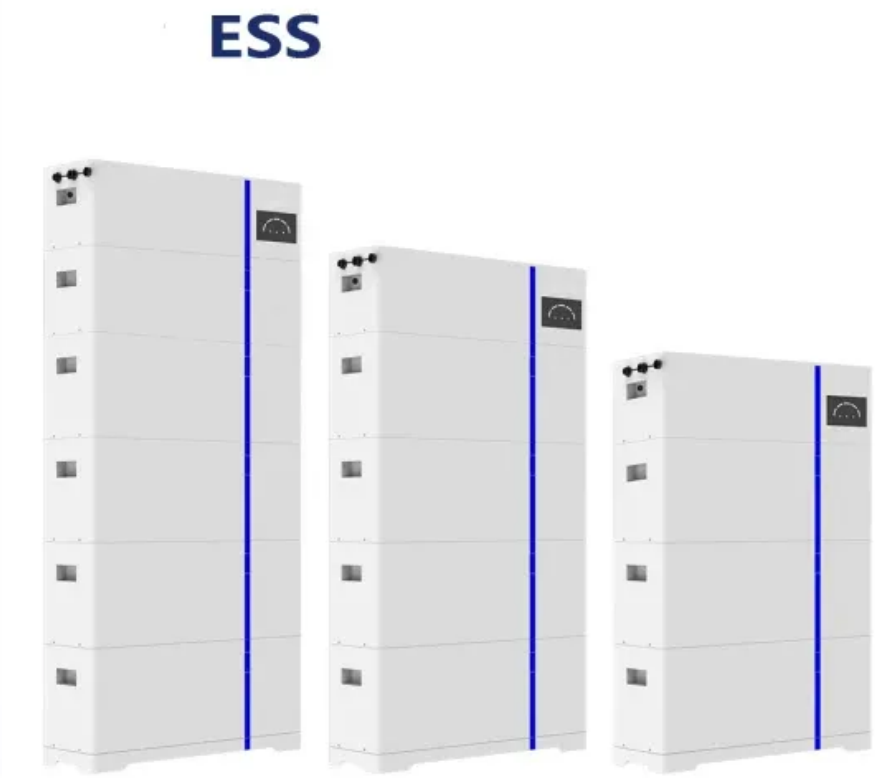
# Photothermal energy storage efficiency



## Overview

The obtained PCM microcapsules have good thermal stability and durability, with a PCM core content of up to 88.9% and a phase change enthalpy of 214.3 J g −1, which is expected to be used in thermal energy storage and temperature regulation applications.

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Strategic design enabled the seamless amalgamation of photothermal conversion and heat transportation during solar-energy storage, enhancing the solar-heat-storage efficiency of the fabricated system.

Importantly, the photothermal conversion and storage efficiency of ODA@MOF/PPy-6% is up to 88.3%. Additionally, our developed MOF-based photothermal composite PCMs also exhibit long-standing antileakage stability, energy storage stability, and photothermal conversion stability.

The efficient thermal utilization of solar energy is limited by the uncertainty in irradiation intensity, making it urgent to develop materials that integrate both photothermal conversion and thermal energy storage functions [4].

Developing high-efficiency solar photothermal conversion and storage (SPCS) technology is significant in solving the imbalance between the supply and demand of solar energy utilization in time and space.

## Photothermal energy storage efficiency


### Flexible textiles with polypyrrole deposited phase change microcapsules

Abstract The design of flexible phase change textiles with photothermal conversion/storage performance provides a new direction for their potential applications in ...

### Emerging urchin-like core-shell mineral microspheres with efficient

Enormous challenges still seriously restrict the application of phase change materials (PCMs) in thermal energy storage and heat management systems, such as their ...

### Photothermal Mineral-Based Composite Phase ...

Solar energy, the most promising renewable energy, suffers from intermittency and discontinuity. Phase change material (PCM)-based energy ...

### Photo-thermal conversion and energy storage

Photons can be absorbed by the energy storage process of PCMs, which exhibits the excellent photo-thermal energy storage characteristic,

then stored in the way of internal ...


## Highly efficient and stable solar-driven seawater desalination ...

Nevertheless, its performance was greatly reduced in intermittent sunlight and uncontrollable weather. Herein, we proposed a composite photothermal structure with energy ...

## Sustainable Porous Scaffolds with Retained

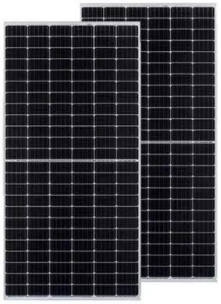
After the impregnation of PCMs, obtained POW/PCMs exhibit excellent shape-stability, latent heat storage capability, and high solar-thermal energy storage efficiency due to ...


## Photothermal Nanomaterials: A Powerful Light-to-Heat ...

All forms of energy follow the law of conservation of energy, by which they can be neither created nor destroyed. Light-to-heat conversion as a ...

## Elevating the Photothermal Conversion Efficiency of Phase ...

To alleviate the predicament of resource shortage and environmental pollution, efficiently using abundant solar energy is a great challenge. Herein, we prepared unique photothermal ...



## Fabricating MOF-derived CoNC@FeNC phase change

5 ???· This confirmed the efficient photothermal conversion and energy storage capabilities of the prepared composite PCMs. The photothermal conversion efficiency (?) was calculated ...

## Thermally conductive phase change composites for efficient ...

An integrated photothermal storage device was constructed and heated by a Fresnel lens to concentrate the 1000 W/m 2 light from a solar simulator, and the heat storage ...


## The robust fluoride-free superhydrophobic thermal energy storage

The fluoride-free superhydrophobic thermal energy storage coating exhibits excellent superhydrophobicity, durability and photothermal conversion efficiency, which holds ...

## Polypyrrole-boosted photothermal energy storage in ...

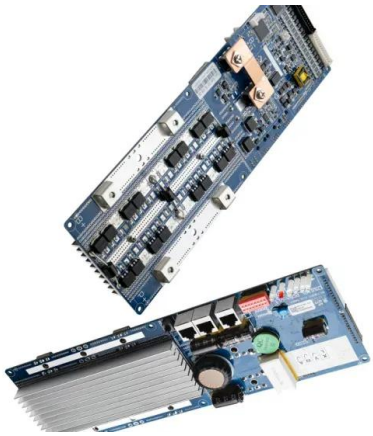
Importantly, the photothermal conversion and storage efficiency of ODA@MOF/PPy-6% is up to 88.3%. Additionally, our developed MOF ...

## Enhanced Light Absorption and Photothermal Efficiency of Silica ...

Strong absorption of near-infrared (NIR) light is essential for efficient solar-energy application. NIR absorption mainly depends on surface plasmon resonance and the high ...

## Experimental study on supercooled phase change material for

The incorporation of CMC and EG into the hydrated salt PCM enhances both the degree of supercooling and the photothermal conversion efficiency, offering a promising ...



## Polypyrrole-boosted photothermal energy storage in MOF-based ...

The resulting MOF-based composite PCMs exhibit intense and broadband light absorption characteristic in the ultraviolet-visible-near-infrared region, and the photothermal ...

## Coupled Photochemical Storage Materials in Solar ...

Compared to other solar energy utilization technologies, photothermal technology exhibits superior energy conversion efficiency due to ...


## Comprehensive evaluation of the photothermal conversion ...

Therefore, this study aims at achieving thermochemical energy storage below 120 °C for building heating, based on porous graphite felt with photothermal absorption and three ...

## High-directional thermally conductive stearic acid/expanded ...

Moreover, we have introduced an advanced high-photothermal conversion layer that synergizes with our directionally conductive phase change composite. This strategic combination ...

## Efficient solar thermal storage of foamy bamboo charcoal-based

Improving the efficiency of photothermal conversion and exploring efficient light-absorbing and thermal storage materials have become the key issues in the efficient utilization ...

## Composite phase-change materials for photo-thermal conversion ...

PTCPCESMs can facilitate the conversion and storage of solar energy and can overcome the limitations of structural stability, thermal conductivity, light absorption capacity, ...


## Synergistic enhancement of photothermal energy storage ...

Phase change materials (PCMs) are a crucial focus of research in the field of photothermal energy storage. However, due to their inherently low photothermal conversion ...

## Polydopamine/copper nanoparticles synergistically modified ...

Furthermore, the energy storage efficiency and energy storage capacity increased with the rise of the PCM mass fraction ratio, which proved that the PCM acted as an ...

## Delignified wood for thermal energy storage with high efficient ...

In this study, a phase change energy storage wood (PCES-Wood) with efficient photo-heat conversion efficiency was obtained by impregnating polyethylene glycol based ...

## Paraffin@Hectorite-SiO2/Fe3O4 microcapsule phase change ...

Research Paper Paraffin@Hectorite-SiO2/Fe3O4 microcapsule phase change fluid for efficient photothermal energy storage and heat dissipation

## TiN supported 3D directional tubular skeleton encapsulating ...

Phase change materials (PCMs) have problems of melt leakage, weak sunlight absorption, and low photothermal conversion efficiency, which greatly limit their applications in efficient solar ...

## Photothermal storage and controllable release of a phase-change

Abstract Photochemical phase transition is an effective strategy to realize photothermal conversion and multi-source energy storage. Azobenzene molecule with photo ...


## A novel phase change materials used for direct photothermal ...

Photothermal conversion phase change materials can combine the mechanisms of photothermal conversion and phase transformation to realize storage or release solar ...

## Recent advances and perspectives in solar photothermal ...

Developing high-efficiency solar photothermal conversion and storage (SPCS) technology is significant in solving the imbalance between the supply and demand of solar ...


## Photothermal Nanomaterials: A Powerful Light-to-Heat ...

For enhancing the photothermal performance, photothermal nanomaterials can be designed to consist of a single component or multiple ...

## Sustainable Porous Scaffolds with Retained

After the impregnation of PCMs, obtained POW/PCMs exhibit excellent shape-stability, latent heat storage capability, and high solar-thermal ...

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