Research on photothermal phase change energy storage field

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.

What is photo-thermal conversion phase-change composite energy storage?
Based on PCMs, photo-thermal conversion phase-change composite energy storage technology has advanced quickly in recent years and has been applied to solar collector systems, personal thermal management, battery thermal management, energy-efficient buildings and more. The future research should address:

What are photothermal phase change materials (ptpcms)?
Photothermal phase change materials (PTPCMs) represent a novel type of composite phase change material(PCM) aimed at improving thermal storage efficiency by incorporating photothermal materials into traditional PCMs and encapsulating them within porous structures.

Are phase change materials suitable for solar thermal storage?
Phase change materials (PCMs) have garnered considerable interest owing to their capacity to store and release substantial amounts of heat during phase transitions [5 - 8],particularly for solar thermal storage[9 - 11]. Nevertheless,the low thermal conductivity and leakage problems associated with pure PCMs limit their practical use .

What are photo-thermal conversion materials & PCMs?
They consist of photo-thermal conversion material and PCMs,which can store or release a large amount of thermal energy during the solid-liquid phase-change process. These materials have great potential for applications in desalination,heating,construction,and solar energy storage systems.

How can photothermal agents improve the thermal conductivity of PCMS?
The introduction of photothermal agents can improve the thermal conductivity of PCMs,allowing heat to be transferred more rapidly to the interior of the material,facilitating the acceleration of the phase change process and improving thermal energy conversion efficiency .

In this review, based on their distinct chemical compositions, the phase change thermal storage materials currently used in photothermal conversion applications are categorized and ...

This paper reviews the research on PTCPCESMs from China and other abroad, which can improve the utilization and conversion rate of full-spectrum sunlight, address the ...

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The preparation of phase change materials (PCMs) with high energy storage, thermal conductivity, and photothermal conversion capability is essential for improving solar ...

ABSTRACT The urgent demand for renewable energy solutions, propelled by the global energy crisis and environmental concerns, has spurred the creation of innovative materials for solar ...

For photothermal phase change materials, the photothermal conversion of lignin contributes to efficient thermal energy storage by enabling ...

Abstract The problem of solar intermittency can be effectively addressed by solar-to-thermal energy storage using phase change materials (PCMs). Nevertheless, intricate ...

Thermal energy storage (TES) is essential for solar thermal energy systems [7]. Photothermal materials can effectively absorb solar energy and convert it into heat energy [8], ...

The advantages and disadvantages of phase change materials are compared and analyzed. Summary of the application of phase change storage in photovoltaic, light heat, ...

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

The phase change composites (PCCs) for efficient photothermal and electrothermal conversions were subsequently fabricated by vacuum-impregnating the ...

Energy conversion and storage are crucial for overcoming energy-shortage problems. Herein, we designed and synthesized a type of magnetic phase-change ...

Download Citation | On Feb 1, 2025, Rongjun Wei and others published Bioinspired wood-based composite phase change materials for efficient photothermal conversion and energy storage | ...

The integration of CuS into phase change material (PCM) enables the unification of photothermal conversion and thermal energy storage. In this study, to avoid ...

The applications of composite phase change materials were limited due to their poor energy utilization efficiency, low thermal conductivity and strong rigidity. In this work, ...

Recently, wood-based phase change materials have broad research prospects in energy management materials, but their complex preparation process, low thermal ...

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

With the continuous increase in global energy demand and environmental challenges, the efficient utilization and storage of energy have become critical areas of ...

Photothermal phase change energy storage materials (PTCPCESMs), as a special type of PCM, can store energy and respond to changes in illumination, enhancing the efficiency of energy ...

This paper systematically reviews the latest research progress in phase change thermal energy storage from three perspectives: the characteristics and thermal property ...

The reinforced photothermal effect of conjugated dye/graphene oxide-based phase change materials: fluorescence resonance energy transfer and applications in solar ...

The demand for a low-carbon lifestyle stimulates the high-efficiency utilization of solar energy despite its low conversion rate and ...

<p>Photothermal phase change energy storage composites have the advantages of high photothermal conversion efficiency and large latent heat storage, which can alleviate the ...

Phase change materials (PCMs) have attracted significant attention in thermal management due to their ability to store and release large amounts of heat during phase ...

Request PDF | On Jul 1, 2023, Changqing Liu and others published Polypyrrole-Coated Expanded Graphite-based Phase Change Materials for Photothermal Energy Storage | Find, ...

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

Request PDF | On Oct 1, 2024, Qingqing Hu and others published Polyacrylamide phase-change gels based on doped MoS2-rGO for efficient solar energy photothermal conversion and ...

Photothermal phase change materials (PCM) are employed for the efficient conversion and storage of solar energy. In this work, a Cu-Zn bi-metallic metal-organic ...

Abstract Infiltrating phase change materials (PCMs) into nanoporous metal-organic frameworks (MOFs) is accepted as a cutting-edge ...

To alleviate the predicament of resource shortage and environmental pollution, efficiently using abundant

solar energy is a great challenge. Herein, we ...

Research papers Multifunctional phase-change materials with Ni-MOF/MXene hierarchical network for thermal energy storage, photothermal conversion, and excellent ...

Building on their dual functionality for solar photothermal absorption and storage, slurries/dispersions of micro/nano-encapsulated phase-change materials (ePCMs) are capable ...

In recent years, phase change materials (PCM) have become increasingly popular for energy applications due to their unique properties. However, the low thermal ...

Phase-change materials (PCMs) are essential for advancing clean energy technologies and enhancing energy efficiency. However, pure PCMs have problems such as ...

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