Research on phase change energy storage devices

What is phase change energy storage technology?
Phase change energy storage technology is based on phase change energy storage materialsas the basis of high technology,phase change materials Phase change latent heat is large,much larger than the apparent heat energy storage density.

What are the advantages of phase change thermal storage devices?
In comparison with sensible heat storage devices,phase change thermal storage devices have advantages such as high heat storage density,low heat dissipation loss,and good cyclic performance,which have great potential for solving the problem of temporal and spatial imbalances in the transfer and utilization of heat energy.

Are phase change materials suitable for thermal energy storage?
Phase change materials (PCMs) having a large latent heat during solid-liquid phase transition are promisingfor thermal energy storage applications. However,the relatively low thermal conductivity of the majority of promising PCMs (<10 W/(m ? K)) limits the power density and overall storage efficiency.

Why is enhanced heat transfer important in phase change thermal storage devices?
However,there are also issues such as the small thermal conductivity of phase change materials (PCMs) and poor efficiency in heat storage and release,and in recent years,enhanced heat transfer in phase change thermal storage devices has become one of the research hotspots for optimizing thermal storage devices.

What is a phase change thermal energy storage system (PCM)?
In phase change thermal energy storage technology, PCMs play a crucial role in determining the performance of the energy storage system. Researching and finding safe, reliable, high energy density, and high-performance PCMs is key to the advancement of phase change thermal energy storage technology. 2.2. Principles for selecting PCMs

What are phase change energy storage materials (pcesm)?
1. Introduction Phase change energy storage materials (PCESM) refer to compounds capable of efficiently storing and releasing a substantial quantity of thermal energy during the phase transition process.

Solid-liquid phase change materials (PCMs) have been studied for decades, with application to thermal management and energy storage due to the large latent heat with a ...

This Review provides a review of enhanced heat transfer in phase change thermal storage devices from two aspects: internal structure ...

In this review, we systematically examine the latest research in phase change thermal storage technology and

place special emphasis on active methods using external field ...

Latent thermal energy storage was widely used in many thermal engineering, but the low thermal conductivity of Phase-Change Material (PCM) limited the thermal storage ...

Despite numerous studies focusing on the individual heat exchange structures of phase change heat storage devices, further research is necessary to explore ...

The development of shape-stabilized phase change materials (ss-PCMs) with efficient solar energy conversion performance, large energy ...

Thermal energy storage (TES) is increasingly important due to the demand-supply challenge caused by the intermittency of renewable energy and waste he...

This research sets a clear framework for comparing thermal storage materials and devices and can be used by researchers and designers to increase clean energy use with ...

The heat accumulator can overcome the intermittent and fluctuating problems of the new energy structure and provide a guarantee for the efficiency of the thermal system. It is ...

Phase change energy storage materials are a new achievement in the development of modern energy storage professionals, playing an important role in multiple fields such as energy ...

Feng Guojun, Feng Cuimin, Kang Jianwei, et al. Simulation study on application effect of phase change energy storage materials in ground ...

The finding demonstrate that future research should focus on clarifying the multi-phase coupling heat transfer mechanism inside the heat storage device, improving the heat storage device"s ...

In order to meet the needs of environmental protection and industrial production, a new type of phase change thermal storage electric heating device was designed by combining the crude oil ...

This work introduces a self-regulating device for the repeated temperature-controlled release of heat from sodium acetate trihydrate used as switchable phase change ...

Request PDF | On Mar 1, 2025, Lu Liu and others published A comprehensive investigation of phase change energy storage device based on structural design and multi-objective parameter ...

The objective of this review is to expand the application of polymers in the field of phase change energy storage and to provide more research ideas for the development of ...

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INTRODUCTION Solid-liquid phase change materials (PCMs) have been studied for decades, with application to thermal management and energy storage due to the large latent heat with a ...

The growing demand for sustainable energy solutions has intensified research on phase change materials (PCMs) due to their ability to efficiently store and release thermal ...

In comparison with sensible heat storage devices, phase change thermal storage devices have advantages such as high heat storage density, ...

This article designs a high-altitude border guard post that can fully utilize the heat absorbed by solar collectors to continuously store thermal energy during the day and ...

Therefore, by combining crude oil heating and viscosity re-duction methods, valley electricity, and composite phase change material technol-ogy, a new type of phase change thermal storage ...

The phase change energy storage device integrating with filament tube heat exchanger and form-stable phase change material (PCM) with expanded graphite (EG) was ...

Phase change materials (PCMs)-based thermal storage systems have a lot of potential uses in energy storage and temperature control. However, organic P...

Abstract: Thermal energy storage (TES) technology relies on phase change materials (PCMs) to provide high-quality, high-energy density heat storage. However, their cost, poor structural ...

Abstract: Phase change energy storage is a technology to realize energy storage through the absorption/release of latent heat during phase change processes. It can balance the mismatch ...

Phase change energy storage devices represent a groundbreaking advancement in thermal energy management. By leveraging the unique properties of phase ...

Renewable energy systems, particularly solar power generation, face challenges from inherent intermittency and stochastic power variability. Metallic phase change materials (PCMs) in ...

The paper emphasizes the integration of phase change materials (PCMs) for thermal energy storage, also buttressing the use of encapsulated PCM for ...

Phase change materials (PCMs) having a large latent heat during solid-liquid phase transition are promising for thermal energy storage applications. However, the relatively low thermal ...

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It summarizes the enhanced heat transfer measures of various types of phase change thermal storage devices and discusses the role of structural parameters in enhanced heat transfer. It is ...

Abstract The research on phase change materials (PCMs) for thermal energy storage systems has been gaining momentum in a quest to identify better materials with low-cost, ease of ...

The effects of different circulating water flow rates, mass fractions, stirring rates, and gas injection rates on the average storage/release rates of phase change ...

This study provides theoretical guidance and technical references for the design and use of phase change thermal storage devices. ...

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