Solar Energy

Enhanced thermal conductivity of phase change solar container materials

Overview

NPCMs incorporate superior-performance nanoparticles within traditional phase change material matrices, resulting in improved thermal conductivity, energy storage density, and phase change efficiency. To address these limitations, nanoparticle-enhanced phase change materials (NPCMs) have emerged as a promising solution for enhancing thermal energy storage in solar thermal systems. NPCMs incorporate superior-performance nanoparticles within traditional phase change material matrices, resulting in. To clarify future research directions, this study first analyzes the heat transfer process of solar-thermal conversion and then reviews solar-thermal phase change composites for high-efficiency harnessing solar energy. The focus is on enhancing heat absorption and conduction while aiming to. Phase change materials (PCMs) are used for thermal energy storage and can absorb/release heat, but they face the problem of poor thermal conductivity. To enhance the thermal conductivity of the PCMs nanofluids are integrated into it. PCMs heat transfer efficiency is increased by taking advantage of.

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Nanoparticle-Enhanced Phase Change Materials (NPCMs) in Solar ...

NPCMs incorporate superior-performance nanoparticles within traditional phase change material matrices, resulting in improved thermal conductivity, energy storage density, and phase ...

Experimental investigation of the solidification behavior and energy

In response to this concern, researchers have been exploring the application of latent heat thermal energy storage systems (TESS) utilizing phase change materials (PCMs) as an energy storage ...

Composite phase change materials with efficient solar ...

The thermal conductivity and solar-thermal conversion performance of CPCMs are further enhanced, with PM50Oc exhibiting a thermal conductivity of 0.42 W/ (m·K) and a solar-thermal ...

Graphene-enhanced thermally flexible polyethylene glycol-based phase

However, the technology is constrained by the low thermal conductivity and phase change

leakage associated with PCM. In this study, we developed a novel thermally flexible composite phase change ...

Oriented High Thermal Conductivity Solid-Solid Phase Change ...

Overall, this work provides a technological route to the large-scale fabrication of mid-temperature solar energy storage materials with high thermal conductivity, high phase change ...

Steel-Based Thermal Energy Storage: A Comprehensive Overview

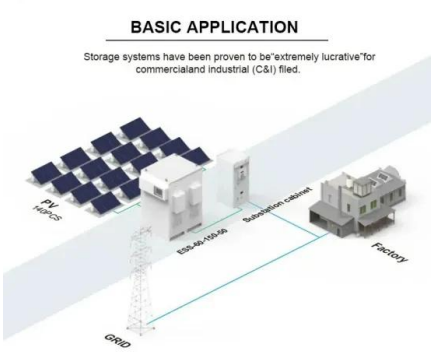
Steel's high melting point means it can potentially be heated to very high temperatures (limited by container and system materials), allowing greater energy storage per unit mass compared ...

Preparation and characterization of attapulgite-supported phase change

Phase change materials (PCMs) for the charge and discharge of thermal energy at a nearly constant temperature are of interest for thermal energy storage and management, and porous materials are ...

Ultra-flexible, Adaptable and Multifunctional Polymer-Based ...

When applied to lithium-ion batteries, the enhanced thermal conductivity and phase-change temperature suitable for safe operation of this material significantly reduced battery operating ...



Tetracosane as a Phase Change Material for Thermal Energy Storage

Low Thermal Conductivity: Like most organic PCMs, tetracosane has a low thermal conductivity, which can hinder the rate of heat transfer during charging and discharging cycles. This can be addressed ...

Effect of rotation control on thermal performance of phase change unit

Therefore, research on intensifying solid-liquid phase change heat transfer has become a core challenge for optimizing the comprehensive efficiency of building solar energy utilization systems [10, 11].

Preparation and performance investigation of a high thermal

As a pivotal clean energy technology, photovoltaic (PV) power generation exhibits diminished photoelectric conversion efficiency under elevated operating temperatures. Consequently, this study ...

Enhanced thermal conductivity of phase change composites with ...

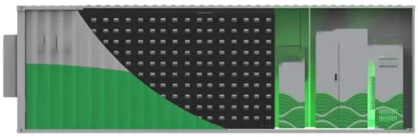
Applied Energy, 2015 Polyethylene glycol based shape-stabilized phase change material for thermal energy storage with ultra-low content of graphene oxide Solar Energy Materials and Solar Cells, ...

Metal foam and topological fin structures for heat release process

This study investigates a horizontal phase change energy storage unit enhanced in heat transfer by integrating topological fins and metal foam (MF). This study employed numerical simulation to ...

Biomimetic fractal fins for enhanced thermal performance in fin-and

This study experimentally investigates the thermal performance of a novel biomimetic fractal-fin configuration designed to overcome the low thermal conductivity of phase change ...



Pulse heating and slip enhance charging of phase-change thermal ...

A strategy based on the design of a composite coating that enables slip-enhanced close-contact melting inside sealed phase-change thermal batteries to improve charging rates enables high

Solidification performance enhancement of a latent heat thermal ...

This paper aims to study the effect of circular Y-shaped fin arrangement to improve the low thermal response rates of a double-tube heat exchanger containing Paraffin phase change material ...

Aerogels enable multifunctionality in GFRP composites: enhanced

These findings not only offer a breakthrough in packaging materials with significantly enhanced thermal conductivity but also provide a promising avenue for the development of other ...

Numerical investigations of phase change material (PCM)-based ...

Numerical investigations of phase change material (PCM)-based battery thermal management system (BTMS) under variable gravity environment - Free download as PDF File (.pdf), Text File (.txt) or ...

Bioinspired Spectrally Selective Phase-Change Composites for ...

Inspired by the thermoregulation mechanisms of polar bears, this work introduces composite PCMs with spectrally selective absorption to enhance solar thermal energy storage ...

Fly ash based shape-stabilized phase change materials for high

Semantic Scholar extracted view of "Fly ash based shape-stabilized phase change materials for high-temperature thermal energy storage with enhanced thermal conductivity" by Ying Li et al.

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