

JH Solar

Wood structure phase change energy storage material



Overview

Herein, we designed and fabricated a graphene wrapped wood-based phase change composite with electro-thermal conversion and energy storage capabilities by delignification of natural wood, coverage and reduction of graphene oxide (GO), impregnation of 1-tetradecanol (TD) and package of epoxy resin.

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Building shape-stable phase change materials (PCMs) are crucial for their practical applications. Particularly, it is vital to utilize renewable/recyclable biomass media as the support material of form-stable PCMs. In this review article, we summarized the recent developments for building.

In this work, we prepared a composite phase change material by using wood as the matrix and polyethylene glycol (PEG) as phase change material (PCM). The composite realized a pH-induced function with the impregnation of litmus. As a hierarchical porous material, wood particle had a high PEG loading.

“ Use of phase change materials in wood and wood-based composites for thermal energy storage: A Review,” *BioResources* 18 (4), 8781-8805. Using phase change materials (PCMs) is an efficient solution for reducing energy consumption in buildings. These materials have a large capacity for storing.

Wood, a renewable and abundant biomass resource, holds substantial promise as an encapsulation matrix for thermal energy storage (TES) applications involving phase change materials (PCMs). However, practical implementations often reveal a disparity between observed and theoretical phase change. Can phase change materials be used for thermal energy storage?

“ Use of phase change materials in wood and wood-based composites for thermal energy storage: A Review ,” *BioResources* 18 (4), 8781-8805. Using

phase change materials (PCMs) is an efficient solution for reducing energy consumption in buildings.

Are wood-based phase change materials reversible thermochromic?

To broaden the application scope of wood-based phase change materials (PCMs) and increase their functional diversity, this research seeks to create a wood-based energy storage composite material that incorporates both phase-change capabilities and reversible thermochromic properties (TPW).

Can phase change materials be used in wood?

Phase change materials have been successfully incorporated into various construction materials such as concrete, brick, or plaster. The primary objective of this review is to examine previous studies conducted on the application of PCMs in wood.

Does a wood-based phase change composite conserve energy?

In addition, the energy storage capability and thermal reliability of the prepared wood-based phase change composite are investigated by DSC and TG measurements, and its electro-thermal conversion and heat preservation are also explored by an infrared thermal camera.

What is a composite phase change material?

In this work, we prepared a composite phase change material by using wood as the matrix and polyethylene glycol (PEG) as phase change material (PCM). The composite realized a pH-induced function with the impregnation of litmus. As a hierarchical porous material, wood particle had a high PEG loading and solved the liquid leakage of PEG efficiently.

What are phase change materials?

Phase change materials (PCMs) are widely used as latent energy storage systems. They possess a considerable capacity for storing energy, good thermal reliability (which involves a satisfactory efficiency of the material after many cooling and heating cycles), stability, and high energy density.

Wood structure phase change energy storage material

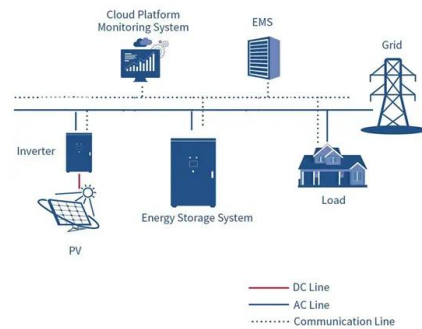


A form-stable wood-based phase change material via double ...

5 ???· Phase change material (PCM) stores or releases significant amounts of latent heat by altering its physical state (solid-liquid, liquid-gas, solid-gas, solid-solid) within a specific ...

Phase Change Thermal Storage Materials for ...

Functional phase change materials (PCMs) capable of reversibly storing and releasing tremendous thermal energy during the isothermal phase change process have recently received tremendous ...



Development of Phase Change Plywood ...

Abstract Wood-based phase change materials (WBPCM) have the potential to significantly reduce energy consumption in plywood structures, but the quest for a streamlined production strategy to facilitate ...

Carbonized-wood based composite phase change materials ...

Abstract The integration of photo-thermal conversion and thermal energy storage is an

efficient way to improve the solar energy utilization. Phase change material ...

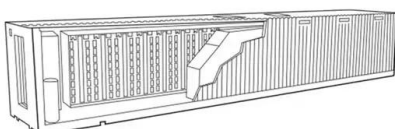


The Confinement Behavior and Mechanistic ...

This research significantly advances the understanding of nanoconfinement mechanisms in wood-derived matrices, paving the way for the development of high-performance, shape-stabilized composite PCMs ...

Optically controlled phase change wood for energy storage and ...

This work paves the way for the development of phase change wood for efficient solar energy storage and release and application in encrypted information display.



Bioinspired wood-based composite phase change materials for ...

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 , ...

Wood-based composite phase change materials with self ...

Moreover, the superhydrophobic composite phase change materials possess excellent thermal reliability and stability, efficient solar-to-thermal energy conversion and self ...



Wood flour/-poly (methyl methacrylate)/capric acid polymer ...

This study focuses on the preparation and characterization of wood flour (WF)/polymethyl methacrylate (PMMA)/capric acid (CA) composite form-stable phase change ...

Graphene wrapped wood-based phase change composite for ...

Herein, we designed and fabricated a graphene wrapped wood-based phase change composite with electro-thermal conversion and energy storage capabilities by ...



Synthesis and characterization of wood-based phase change

...

In this study, a sustainable wood-based phase change material with high photothermal conversion efficiency was prepared successfully by combining wood, PEG and ...

Shaped ionic wood for enhanced phase change performance

The results showed that the phase change energy storage material PEG-CaCl₂ was successfully impregnated into the pore structure of wood; calcium chloride was effectively ...

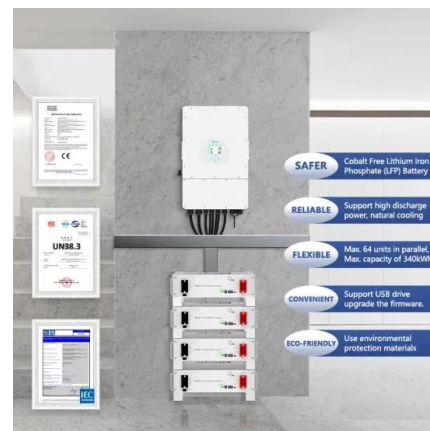


Oriented cellulose scaffold-based carbonized wood-supported phase

Phase change materials are highly valued for their high energy storage density, excellent thermal efficiency, and narrow temperature variation range, making them one of the ...

Properties of oak wood incorporating ...

Abstract Microencapsulated phase change materials (MPCMs) incorporated into oak wood via vacuum impregnation have shown promise as thermal energy storage (TES) materials. Physical and chemical properties of ...



Fabrication of thermal energy storage wood composite based on ...

In this study, a kind of phase change energy storage wood was synthesized successfully by using PEG 1500 as the phase change material and Balsa wood as the carrier.

Leak-proof wood-based phase change materials composites

...

Phase change energy storage materials prepared using wood as the substrate can store and convert solar energy, and have gained popularity in areas such as energy ...



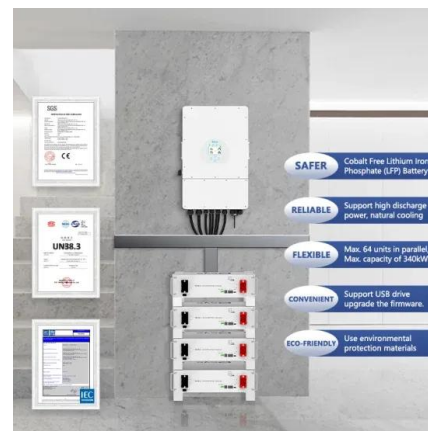
pH-responsive wood-based phase change material for thermal energy

In this work, we prepared a composite phase change material by using wood as the matrix and polyethylene glycol (PEG) as phase change material (PCM). The composite ...



Optimizing the interface compatibility of transparent wood for ...

Phase-change transparent wood (TW/DO-OTS) has the characteristics of energy storage, light transmission and regulates environmental temperature by absorbing or releasing ...



6th International conference on energy, materials and ...

Wood-plastic composites (WPCs) have gained popularity in outdoor applications due to their unique properties compared to conventional materials. However, ...

Transparent wood with phase change heat storage as novel green energy

Transparent wood is a great potential biomass building material with good insulation and optical properties for the rapid growth building energy consumption and ...

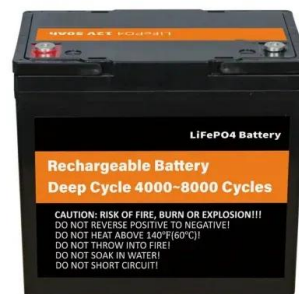


Liquid metal/wood-based phase change materials with ...

As a phase change material, Ga exhibits a low melting point, close to human body temperature, and high thermal conductivity. Wood's unique anisotropic porous structure ...

Form-Stable Phase Change Material with Wood ...

In this review article, we summarized the recent developments for building form-stable PCMs consisting of wood as a supporting material, either carbonized wood or wood composites.



Metallic wood-based phase change material with superior

...

The phase change temperatures, enthalpies and chemical structure of MWM remained unchanged after 100 thermal cycles, demonstrating outstanding cycling reliability. ...

Form-Stable Phase Change Material with Wood ...

Building shape-stable phase change materials (PCMs) are crucial for their practical applications. Particularly, it is vital to utilize renewable/recyclable biomass media as the support material of form ...



Shaped ionic wood for enhanced phase change ...

The results showed that the phase change energy storage material PEG-CaCl₂ was successfully impregnated into the pore structure of wood; calcium chloride was effectively combined with -COOH in TEMPO ...

pH-responsive wood-based phase change material for thermal ...

Phase change materials have been successfully incorporated into various construction materials such as concrete, brick, or plaster. The primary objective of this review is to examine previous ...



Preparation of phase change Heat storage wood with in-situ ...

Wood has been developed with phase change heat storage function using balsa as a natural packaging material, and PEG was employed as a material for phase change heat ...

Recent advances in energy storage and ...

Energy storage and applications of form-stable phase change materials with recyclable skeletons for reducing carbon emissions and promoting the development of sustainable energy.



Photo/Electro-Thermal Superhydrophobic Wood ...

The superhydrophobic wood composite with photo/electro-thermal and phase change energy storage properties endow the surfaces with anti-/deicing functions. The phase change materials filled in the ...

Bioinspired wood-based composite phase change materials for ...

In this paper, a marine bioinspired wood-based composite phase change materials (DW-CI/EP/PEG) with effective photothermal conversion and energy storage ...



Leakage Proof, Flame-Retardant, and Electromagnetic Shield Wood

Phase change materials (PCMs) offer a promising solution to address the challenges posed by intermittency and fluctuations in solar thermal utilization. However, for ...

Lignin-retaining porous bamboo-based reversible thermochromic phase

Shaped-stabilized reversible thermochromic phase change materials of (TBC-LB, TBB-LB) were assembled by impregnation the TBC (crystal violet lactone/bisphenol ...



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Linux operation system
quad-core processors
smooth and stable system

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