

5) Doped magnetic nanoparticles in carbon-based composite PCMs can realize the magnetic-to-thermal energy conversion; however, this design technology is new, and the corresponding researches are still few. In addition, current magnetic-to-thermal energy conversion efficiency is ...

In thermal energy storage (TES) systems, latent heat storage has distinct advantages over sensible heat storage or thermochemical reactions due to its high energy density with a slight temperature ...

The melting of nano-enhanced phase change material (NEPCM) in a latent heat thermal storage system is investigated for PCM loaded within an annulus between an outer wavy cylinder and an inner Koch snowflake cylinder. The inner Koch snowflake cylinder is used in this study to increase the heating surface area and enhance the NEPCM melting process.

The global use of energy for space cooling is growing faster than any other energy end-use in buildings; it has more than tripled from 1990 to 2016, and it is expected to increase further by an additional three times by 2050 [1]. Buildings in the United States consume about 76% of the total national electricity demand, and HVAC systems are responsible for ...

energy storage material makes use of itself phase state or structural changes, to automatically absorb or release latent heat from or to the environment so as to achieve the control of the environment temperature. Hallot et al. [9] proposed a new method of thermal insulation based on the use of phase change energy storage materials. In

The main concerns of heat transfer studies are temperature and heat flux management -- heating or cooling targets to suitable temperatures; and energy harvesting -- converting the thermal energy ...

Magnetic energy storage Superconducting magnetic energy storage (SMES) Others: Hybrid energy storage: ... Insulation is also provided at the bottom of the storage, depending on its shape and size. ... The tubes carry thermal energy from the hot water to the gravel-water combination inside the storage tank. The heat from the gravel-water ...

The efficient utilization of solar energy technology is significantly enhanced by the application of energy storage, which plays an essential role. Nowadays, a wide variety of applications deal with energy storage. Due to the intermittent nature of solar radiation, phase change materials are excellent options for use in several types of solar energy systems. This ...

Vehicles operating in space need to withstand extreme thermal and electromagnetic environments in light of the burgeoning of space science and technology. It is imperatively desired to high insulation materials with

lightweight and extensive mechanical properties. Herein, a boron-silica-tantalum ternary hybrid phenolic aerogel (BSiTa-PA) with ...

The multitube design in the shell-and-tube type latent heat thermal energy storage (LHTES) system has received intensive attention due to its promising benefits in enhancing heat storage efficiency. In this paper, single and multi-tube shell LHTES systems were experimentally investigated. First, this study experimentally compared the thermal ...

In recent years, energy conservation became a strategic goal to preserve the environment, foster sustainability, and preserve valuable natural resources. The building sector is considered one of the largest energy consumers globally. Therefore, insulation plays a vital role in mitigating the energy consumption of the building sector. This study provides an overview of ...

Progress in use of nanomaterials in solar thermal energy storage suggests both HTFs and thermal storage PCMs can benefit from ... After fully inserting the heat transfer components into the evacuated tubes, glass wool insulation was placed inside the top opening of the tubes. ... placed on a preheated hot plate also at 100°C and a magnetic ...

The distinctive thermal energy storage attributes inherent in phase change materials (PCMs) facilitate the reversible accumulation and discharge of significant thermal energy quantities during the isothermal phase transition, presenting a promising avenue for mitigating energy scarcity ...

Its insulation effect is better than soft insulation material. In the thermal energy storage optimization of the thermal insulation structure, when the inner layer of the thermal insulation ...

Phase change materials (PCM) have significantly higher thermal energy storage capacity than other sensible heat storage materials [1]. The latent heat thermal energy storage (LHTES) technology using PCM is a highly attractive and promising way to store thermal energy [2, 3]. Numerous studies have been conducted to examine the thermal performance of ...

Latent heat thermal energy storage (LHTES) systems using a phase change material (PCM) can reduce the heat-transfer rates during charging/discharging processes because of their inherently low ...

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