

The current energy crisis has prompted the development and utilization of renewable energy and energy storage material. In this study, levulinic acid (LA) and 1,4-butanediol (BDO) were used to synthesize a novel levulinic acid 1,4-butanediol ester (LBE) by ...

Energy Storage is a new journal for innovative energy storage research, covering ranging storage methods and their integration with conventional & renewable systems. ... Among the alternatives for solving this problem is to use phase ...

the fundamental physics of phase change materials used for energy storage. Phase change materials absorb thermal energy as they melt, holding that energy until the material is again solidified ...

The optimization indexes of the phase change energy storage systems in each climate zone under the full-load operation strategy are shown in Fig. 9. As can be seen from the figure, the energy savings of the phase change energy storage CCHP systems in all five cities are obtained under the full-load operation strategy.

The utilization of phase change material in latent heat thermal energy storage technology is hindered by its limited thermal conductivity. This research aims to enhance the melting properties of a triplex-tube latent heat thermal energy storage unit through active strengthening (rotation mechanism) and passive strengthening (nanoparticle, longitudinal fin) ...

Thermal energy storage can be categorized into different forms, including sensible heat energy storage, latent heat energy storage, thermochemical energy storage, and combinations thereof [[5], [6], [7]]. Among them, latent heat storage utilizing phase change materials (PCMs) offers advantages such as high energy storage density, a wide range of ...

To improve the phase change efficiency, a novel ladder-shaped fin is proposed to accelerate melting process. ... The solid-liquid phase change energy storage system promoted the efficient and ...

In the conventional single-stage phase change energy storage process, the energy stored using the latent heat of PCM is three times that of sensible heat stored, which demonstrated the high efficiency and energy storage capacity of latent energy storage, as depicted in Fig. 3 a. However, when there is a big gap in temperature between the PCM ...

Thermal energy storage (TES) plays an important role in industrial applications with intermittent generation of thermal energy. In particular, the implementation of latent heat thermal energy storage (LHTES) technology in industrial thermal processes has shown promising results, significantly reducing sensible heat losses. However, in order to implement this ...

Phase change energy storage (PCES) is characterized by high energy density, large latent heat, and long service life [18] stores energy by releasing or absorbing latent heat during the phase transition of materials [19]. Phase change materials (PCMs), as efficient and durable energy storage mediums, can ensure the reliable operation of green DCs [20].

Phase change energy storage plays an important role in the green, efficient, and sustainable use of energy. Solar energy is stored by phase change materials to realize the time and space ...

Thermal energy storage technologies utilizing phase change materials (PCMs) that melt in the intermediate temperature range, between 100 and 220 °C, have the potential to mitigate the intermittency issues of wind and solar energy. This technology can take thermal or electrical energy from renewable sources and store it in the form of heat. This is of particular ...

Hasan [15] has conducted an experimental investigation of palmitic acid as a PCM for energy storage. The parametric study of phase change transition included transition time, temperature range and propagation of the solid-liquid interface, as well as the heat flow rate characteristics of the employed circular tube storage system.

Phase change materials (PCMs) are ideal carriers for clean energy conversion and storage due to their high thermal energy storage capacity and low cost. During the phase transition process, PCMs are able to store thermal energy in the form of latent heat, which is more efficient and steadier compared to other types of heat storage media (e.g ...

The PCMs belong to a series of functional materials that can store and release heat with/without any temperature variation [5, 6]. The research, design, and development (RD& D) for phase change materials have attracted great interest for both heating and cooling applications due to their considerable environmental-friendly nature and capability of storing a large ...

1 ??#0183; Metal foam promotes the heat transfer of phase change materials (PCMs) in the penalty of reducing the energy storage density of the composite PCMs. In this work, the effects of constant porosity (0.96, 0.94, 0.92, or 0.90) and pore density (PPI) of metal foam on heat transfer of composite PCMs are studied. Melting rate could be enhanced by employing with low ...

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