

Effect of porosity of conducting matrix on a phase change energy ... DOI: 10.1016/J.IJHEATMASSTRANSFER.2015.09.033 Corpus ID: 123918591; Effect of porosity of conducting matrix on a phase change energy storage device @article{Atal2016EffectOP, title={Effect of porosity of conducting matrix on a phase change energy storage device}, ...

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.

Solar energy is a renewable energy source that can be utilized for different applications in today's world. The effective use of solar energy requires a storage medium that can facilitate the storage of excess energy, and then supply this stored energy when it is needed. An effective method of storing thermal energy from solar is through the use of phase change ...

Thermal energy storage based on phase change materials (PCMs) can improve the efficiency of energy utilization by eliminating the mismatch between energy supply and demand. It has become a hot research topic in recent years, especially for cold thermal energy storage (CTES), such as free cooling of buildings, food transportation, electronic cooling, ...

With the sharp increase in modern energy consumption, phase change composites with the characteristics of rapid preparation are employed for thermal energy storage to meet the challenge of energy crisis. In this study, a NaCl-assisted carbonization process was used to construct porous Pleurotus eryngii carbon with ultra-low volume shrinkage rate of 2%, ...

While TCS can store high amounts of energy, the materials used are often expensive, corrosive, and pose health and environmental hazards. LHS exploits the latent heat of phase change whilst the storage medium (phase change material or PCM) undergoes a phase transition (solid-solid, solid-liquid, or liquid-gas).

Effects of phase-change energy storage on the performance of air-based and liquid-based solar heating systems. Solar Energy, 20 (1978), pp. 57-67. [View PDF](#) [View article](#) [View in Scopus](#) [Google Scholar](#). Nallusamy et al., 2007. N. Nallusamy, S. Sampath, R. Velraj.

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 ...

Flexible phase change materials for thermal energy storage. 1. Introduction. Phase change materials (PCMs) have attracted tremendous attention in the field of thermal energy storage owing to the large energy storage density when going through the isothermal phase transition process, and the functional PCMs have been deeply explored for the applications of solar/electro ...

Conventional phase change materials struggle with long-duration thermal energy storage and controllable latent heat release. In a recent issue of *Angewandte Chemie*, Chen et al. proposed a new concept of spatiotemporal phase change materials with high supercooling to realize long-duration storage and intelligent release of latent heat, inspiring the design of ...

Recent advances in thermosetting resin-based composite phase change materials and enhanced phase change energy storage Citation: XIAO Tong, LIU Qingyi, ZHANG Jiahao, et al. *Acta Materiae Compositae Sinica*, 2023, 40(3): 1311-1327. doi: 10.13801/j.cnki.fhclxb.20220527.001

Thermal energy storage (TES) is of great importance in solving the mismatch between energy production and consumption. In this regard, choosing type of Phase Change Materials (PCMs) that are widely used to control heat in latent thermal energy storage systems, plays a vital role as a means of TES efficiency. However, this field suffers from lack of a ...

Phase change materials (PCMs) have attracted tremendous attention in the field of thermal energy storage owing to the large energy storage density when going through the isothermal phase transition process, and the functional PCMs have been deeply explored for the applications of solar/electro-thermal energy storage, waste heat storage and utilization, ...

Furthermore, the filter cake and thermal images of the phase change energy storage material are presented in Fig. S7, where purple and red segments denote low and high temperatures, respectively. Before heating, the entire plot appears inconspicuous as the sample temperature aligns with the ambient temperature. Over time, the PCM sample absorbs ...

Energy Technology is an applied energy journal covering technical aspects of energy process engineering, including generation, conversion, storage, & distribution. The disparity between the supply and demand for thermal energy has encouraged scientists to develop effective thermal energy storage (TES) technologies.

Phase change materials (PCMs) have attracted significant attention in thermal management due to their ability to store and release large amounts of heat during phase transitions. However, their widespread application is restricted by leakage issues. Encapsulating PCMs within polymeric microcapsules is a promising strategy to prevent leakage and increase ...

According to WEO (World Energy Outlook) reports issued by IEA (International Energy Agency), the world

energy demand will rise by one-third from 2011 to 2035, and simultaneously carbon dioxide (CO₂) emission will also increase by 20 to 37.2% due to energy generation by fossil fuels leading to undesired changes in climate. So, the utilization of fossil ...

In a context where increased efficiency has become a priority in energy generation processes, phase change materials for thermal energy storage represent an outstanding possibility. Current research around thermal energy storage techniques is focusing on what techniques and technologies can match the needs of the different thermal energy storage applications, which ...

A comprehensive review on phase change materials for heat storage applications: Development, characterization, thermal and ... Phase change materials (PCMs) utilized for thermal energy storage applications are verified to be a promising technology due to their larger benefits over other heat storage techniques.

The thermal energy storage capacity of phase change capsules is a critical metric in the assessment of their performance. As shown in Fig. 16, upon complete melting of all structures, the phase change capsule with 6 fins and a wall thickness of 0.5 mm exhibited the highest average temperature of the PCMs, at 352.03 K. Conversely, the capsule ...

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 both enzymatic and chemical methods. The enzymatic method exhibited excellent ...

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 ...

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 ...

Energy security and environmental concerns are driving a lot of research projects to improve energy efficiency, make the energy infrastructure less stressed, and cut carbon dioxide (CO₂) emissions. One research goal is to increase the effectiveness of building heating applications using cutting-edge technologies like solar collectors and heat pumps. ...

Energy storage with PCMs is a kind of energy storage method with high energy density, which is easy to use

for constructing energy storage and release cycles [6] applying cold energy to refrigerated trucks by using PCM has the advantages of environmental protection and low cost [7]. The refrigeration unit can be started during the peak period of renewable ...

The energy changes that occur during phase changes can be quantified by using a heating or cooling curve. Heating Curves. Figure (PageIndex{3}) shows a heating curve, a plot of temperature versus heating time, for a 75 g sample of water. The sample is initially ice at 1 atm and -23°C; as heat is added, the temperature of the ice increases ...

Solar energy is a clean and inexhaustible source of energy, among other advantages. Conversion and storage of the daily solar energy received by the earth can effectively address the energy crisis, environmental pollution and other challenges [4], [5], [6], [7]. The conversion and use of energy are subject to spatial and temporal mismatches [8], [9], ...

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