

Is polyethylene glycol a stable phase change material for thermal energy storage?

Karaman, S.; Karaipekli, A.; Sar?, A.; Biçer, A. Polyethylene glycol (PEG)/diatomite composite as a novel form-stable phase change material for thermal energy storage. Sol. Energy Mater. Sol. Cells 2011, 95 (7), 1647- 1653, DOI: 10.1016/j.solmat.2011.01.022

Are phase change materials suitable for thermal energy storage?

Phase change materials (PCMs) have received substantial interest in the field of thermal energy storage due to their ability to store and release thermal energy in a steady manner for thermal regulation and storage [11, 12, 13, 14].

Is polyethylene glycol a form-stable composite phase change material?

(Elsevier B.V.) This paper deals with the prepn., characterization, and detn. of thermal energy storage properties of polyethylene glycol (PEG)/diatomite composite as a novel form-stable composite phase change material (PCM). The composite PCM was prepd. by incorporating PEG in the pores of diatomite.

Are phase change composites suitable for thermal energy storage?

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.

What are latent heat energy storage materials based on phase change materials?

Latent heat energy storage materials based on the phase change materials (PCMs) provide a promising approach for efficient thermal energy management and utilization, because they can store and release thermal energy reversibly [1,2].

Can polymers be used in phase change energy storage?

It offers a wide range of options for energy storage and application. The use of polymers in phase change energy storage offers opportunities for designing more efficient and sustainable energy systems, considering factors such as shape stability, flexibility, and multifunctionality.

The thermal storage performance, cost, and stability of phase-change materials (PCMs) are critical factors influencing their application in the field of thermal energy storage. Porous carbon, with its excellent support, ...

Polyethylene glycol (PEG) is an important and popular phase change material (PCM), but is not a good antistatic material, which would cause the accumulation of static ...

This study focuses on modifying the porous structure of acid-treated rice husk ash (ARHA) to enhance the

thermal energy storage capacity of poly (ethylene glycol) (PEG) ...

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, ...

The energy crisis has become an increasing serious problem for the human society with the continuous consumption of energy resources on the earth, and consequently the development of energy storage technology has been always important for the effective utilization and rational management of non-renewable resources [1], [2]. Recently, the technique of ...

The exploitation of shape-stabilized phase change materials with high thermal conductivity and energy storage capacity is an effective strategy for improving energy efficiency. In this work, sunflower stem carbon/polyethylene glycol (SS-PEG) and sunflower receptacle carbon/polyethylene glycol (SR-PEG) shape-stabili

DOI: 10.1016/j.carbon.2024.118840 Corpus ID: 267114569; Polyethylene glycol-impregnated carbon quantum dots-phenolic phase change composites for highly efficient thermal energy storage

Among the various kinds of PCMs, PEG has been widely used in numerous fields due to the desirable features. It is considered as a satisfactory phase change material with the decent phase transition temperature and high heat storage capacity [9], [10], which could be easily adjusted via altering mass fraction and molecular weight. At the same time, PEG owns ...

Review on thermal energy storage with phase change materials and applications. *Renew Sustain Energy Rev*, 13 (2) (2009), pp. 318-345, 10.1016/j.rser.2007.10.005. ... The shape-stabilized phase change materials composed of polyethylene glycol and various mesoporous matrices (AC, SBA-15 and MCM-41)

Solvent-free preparation of bio-based polyethylene glycol/wood flour composites as novel shape-stabilized phase change materials for solar thermal energy storage Author links open overlay panel Bin Liang a, Xiang Lu b, Renpu Li ...

Miscibility studies of paraffin/polyethylene blends as form-stable phase change materials. *Eur. Polym. J.*, 52 (0) (2014), pp. 44-52. View PDF View article View in Scopus Google ... latent heat and flame retardant properties of the thermal energy storage phase change materials based on paraffin/high density polyethylene composites. *Renew. Energy* ...

Solid-liquid PCMs are currently commonly used in applications, but their leakage and corrosiveness will affect the application of phase change materials in solar energy storage. Therefore, solid-solid PCMs have

been widely used in practice [115]. Solid-solid PCM is an ideal material in this regard due to its anti-leakage, non-toxicity, and non ...

So we believe that HDPE can be used as a suitable packaging support for paraffin-based phase change energy storage. Simultaneously, we tested the phase change heat of pure paraffin and samples 1-6 by DSC. ... Chen Y, Wu X, Situ Y, Liu J, Huang H (2018) Ethylene-propylene terpolymer-modified polyethylene-based phase change material with ...

Phase change materials (PCMs) having a large latent heat during solid-liquid phase transition are promising for thermal energy storage applications. However, the relatively low thermal conductivity of the majority of promising PCMs ($<10 \text{ W/(m} \cdot \text{K)}$) limits the power density and overall storage efficiency.

In this work, a composite phase change material is prepared by introducing stable polyethylene glycol-based energy storage polymer (PGMA) into the porous structure of delignified wood by high temperature immersion method. ... The combination of wood and phase change energy storage materials (PCMs) can improve the phase change latent heat and ...

Acidic functionalized graphene dispersed polyethylene glycol nano-phase change material for the active cooling of a simulated heat-generating electronic system. ... Polyethylene glycol/silica (PEG@SiO₂) composite inspired by the synthesis of mesoporous materials as shape-stabilized phase change material for energy storage. *Renew. Energy*, 145 ...

This study presents a highly valuable strategy into the quick fabrication of phase change composites, facilitating their practical applications in thermal energy storage. With the ...

Efficient energy conversion and storage technologies are becoming increasingly important in modern research. Due to its inherent characteristics of multi-porosity, high specific surface area and high thermal conductivity, biomass carbon materials can effectively prevent the leakage of phase change material (PCM) in the process of phase change. Wood can ...

Here, we introduce the advantage of solid-to-gel transition to overcome the drawbacks of typical solid-to-liquid counterparts in applications related to thermal energy ...

Phase-change material (PCM) refers to a material that absorbs or releases large latent heat by phase transition between different phases of the material itself (solid-solid phase or solid-liquid phase) at certain temperatures. 1-3 PCMs have high heat storage densities and melting enthalpies, which enable them to store relatively dense amounts of energy under the ...

Polyethylene glycol (PEG) is an important and popular phase change material (PCM), but is not a good antistatic material, which would cause the accumulation of static electricity and electrostatic discharge when

used for the thermal energy storage and thermal management of electrical devices. Herein, we prepared a PEG-based solid-solid PCM ...

The present work outlines the development of eutectic phase change material in different mass fraction ratio and determining its thermal properties. The eutectic mixture was prepared by using polyethylene glycol (PEG) of atomic weight 10 000 and 6000. The eutectic was prepared by using single-step stirring and blending methods. Phase transition temperature and ...

In order to overcome the leakage of solid-liquid PCM and prepare a viable building energy-saving materials for indoor temperature regulation, thermal energy storage composites were prepared by utilizing cellulose grafted PEG as phase change material (PCM) and high-density polyethylene (HDPE) as the substrate.

Polyethylene glycol (PEG) is an important and popular phase change material (PCM), but is not a good antistatic material, which would cause the accumulation of static electricity and electrostatic discharge when used for the thermal energy storage and thermal management of electrical devices.

DOI: 10.1016/j.solmat.2024.112745 Corpus ID: 267684734; Polyethylene glycol/polypyrrole aerogel shape-stabilized phase change material for solar-thermal energy storage and thermoelectric power generation

Polyethylene glycol (PEG), as a polymeric PCM with high flexibility, high energy storage density, and a tunable phase change temperature range that can be controlled by the molecular weight, holds great potential for the development of thermal energy management systems [3,5,6].

In the area of thermal energy storage, phase change material (PCM) is another hot topic due to its high latent heat. Unfortunately, it is constrained by issues such as simple leakage and poor heat conductivity. ... Novel paraffin wax/ultra-high molecular weight polyethylene composite phase change materials modified by carbon nanotubes with ...

Phase change materials (PCMs) with high heat recovery and high energy density were introduced to the wood-plastic composites (WPCs) to regulate the indoor temperature, achieving the purpose of reducing building energy consumption. However, the interface compatibility between PCMs and WPCs seriously restricts its applications. To ...

Polyethylene glycol form-stable phase change materials (PEG FSPCMs) have received much attention in recent years for thermal energy storage applications due to their remarkable thermal properties. However, the conventional synthesis of PEG FSPCMs usually employed chem. grade reagents as starting materials, which is unlikely suitable for large ...

The rapid development of economy and society has involved unprecedented energy consumption, which has generated serious energy crisis and environmental pollution caused by energy exploitation [1, 2] order to

overcome these problems, thermal energy storage system, phase change materials (PCM) in particular, has been widely explored [3, 4].Phase ...

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