



Self-healing phase change energy storage materials

Light-triggered self-healing form-stable phase change materials (FSPCMs) can not only store and release thermal energy, but can also realize self-healing performance under light, showing important practical values. In this article, we provided a new strategy for the preparation of FSPCMs with light-triggered self-healing ability and high thermal energy ...

Thermal energy storage (TES) can provide new ideas for improving energy efficiency by chemical reaction heat, sensible heat or latent heat (heat absorbed or radiated of ...

The design of sustainable self-healing phase change materials (SHPCMs) remains challenging depending on sustainable fatty alcohols without compromising high enthalpy efficiency. Herein, the semi-interpenetrating network (semi-IPN)-based SHPCMs are developed by introducing dynamic disulfide crosslinking polyurethane networks and sustainable fatty ...

Development of recyclable and self-repairing phase-change materials, which enable renewable energy storage and sustainable development, is critical for the efficient utilisation of solar energy ...

Thus, the phase change energy storage technology, flexible materials, and hydrogen-bonded networks were innovatively combined at present work. We have developed a multifunctional room-temperature flexible polyvinyl alcohol (PVA)/polyvinylpyrrolidone (PVP)/lauric acid (LA) film (PPL) with self-healing ability by embedding lauric acid in the ...

Conventional polymeric phase change materials (PCMs) exhibit good shape stability, large energy storage density, and satisfactory chemical stability, but they cannot be recycled and self-healed due to their permanent cross-linking structure. Additionally, the high flammability of organic PCMs seriou ...

DOI: 10.1016/j.nanoen.2024.109437 Corpus ID: 268233324; Composite Phase-Change Materials for Photo-Thermal Conversion and Energy Storage:A review @article{Chai2024CompositePM, title={Composite Phase-Change Materials for Photo-Thermal Conversion and Energy Storage:A review}, author={Zongce Chai and Minghao Fang and Xin Min}, journal={Nano ...

Photo-thermal conversion phase-change composite energy storage materials (PTCPCESMs) are widely used in various industries because of their high thermal conductivity, high photo-thermal conversion efficiency, high latent heat storage capacity, stable physicochemical properties, and energy saving effect. PTCPCESMs are a novel type material ...

Organic phase change materials (PCMs), with inherent capability to charge and discharge latent heat via solid-liquid phase transformation, have obtained significant ...



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Novel phase change material gels confining sodium acetate trihydrate in double cross-linked network are proposed. Sodium acetate trihydrate gels possess high thermal energy storage capacity of 155.11 J/g - 1.. Sodium acetate trihydrate gels present excellent form-stability and high self-healing performance.

The 0.2PPL-2 film exhibits solid-solid phase change behavior with energy storage density of 131.8 J/g at the transition temperature of 42.1 °C, thermal cycling stability (500 cycles), wide-temperature range flexibility (0-60 °C) and self-healing property. Notably, the PPL film can be recycled up to 98.5% by intrinsic remodeling. Moreover, the PPL film can be ...

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Conventional polymeric phase change materials (PCMs) exhibit good shape stability, large energy storage density, and satisfactory chemical stability, but they cannot be recycled and self-healed due to their permanent ...

Conventional polymeric phase change materials (PCMs) have been widely used due to their high heat storage density, small temperature variation, and nontoxicity. However, the high flammability and unrecyclable problems restrict their applications in energy storage devices (ESDs). Although it is facile to introduce a flame retardant into phase change materials to ...

This article summarizes recent advances in self-healing materials developed for energy harvesting and storage devices (e.g., nanogenerators, solar cells, supercapacitors, and lithium-ion batteries) over the past decade.

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 ...

The design of sustainable self-healing phase change materials (SHPCMs) remains challenging depending on sustainable fatty alcohols without compromising high ...

1. Introduction. As an advanced thermal energy storage and management material, phase change materials



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(PCM) have high thermal energy storage density and relatively constant phase change temperature range, which are widely used for thermal management in microelectronic devices [1], solar thermal utilization systems [2, 3], wearable ...

@article{Chen2023TemperaturesensitiveAS, title={Temperature-sensitive and self-healing shape-stable phase change materials containing temperature adjustable ionic liquid for improving the recycling stability and the applicability in cold energy storage}, author={Xiaojing Chen and Xiaolin Qiu and Xiaoyue Fan and Lixin Lu and Ye Zhao and ...

Form-stable phase change materials based on graphene-doped PVA aerogel achieving effective solar energy photothermal conversion and storage Sol. Energy, 255 (2023), pp. 146 - 156, 10.1016/j.solener.2023.03.037

Novel phase change material gels confining sodium acetate trihydrate in double cross-linked network are proposed. o Sodium acetate trihydrate gels possess high thermal ...

Chemically cross-linked polymer matrices have demonstrated strong potential for shape stabilization of molten phase change materials (PCM). However, they are not designed to be fillable and removable from a heat exchange module for an easy replacement with new PCM matrices and lack self-healing capability. Here, a new category of shapeable, self-healing ...

Novel phase change material gels confining sodium acetate trihydrate in double cross-linked network are proposed.. Sodium acetate trihydrate gels possess high thermal energy storage capacity of 155.11 Jg⁻¹. Sodium acetate trihydrate gels present excellent form-stability and high self-healing performance.

Thermal energy storage (TES) can provide new ideas for improving energy efficiency by chemical reaction heat, sensible heat or latent heat (heat absorbed or radiated of phase change materials during a change of phase at a constant temperature and pressure) [].Phase change materials (PCMs) are mainly divided into inorganic materials (such as ...

With the aim at making the use of advantages of inorganic phase change materials and avoiding the above-mentioned drawbacks, firstly, sodium acetate trihydrate was used as a thermal energy storage ...

Semantic Scholar extracted view of "MXene based flexible composite phase change material with shape memory, self-healing and flame retardant for thermal management" by Shiyuan Gao et al. Skip to search form Skip to main content Skip to account menu. Semantic Scholar's Logo. Search 221,941,458 papers from all fields of science. Search. Sign In Create ...

In order to maintain thermal comfort in the human body, photothermal conversion and energy storage microcapsules were designed, developed, and applied in a light-assisted thermoregulatory system. The octyl stearate as a phase change material (PCM) was encapsulated using a polytrimethylolpropane triacrylate



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(PTMPTA)/polyaniline (PANI) ...

However, bio-based recyclable phase change energy storage materials (PCMs), crucial for reducing pollution and sustainable energy storage, have not yet been prepared. Herein, we prepared a novel ...

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Conventional polymeric phase change materials (PCMs) exhibit good shape stability, large energy storage density, and satisfactory chemical stability, but they cannot be recycled and self-healed due to their permanent cross-linking ...

In addition, the melting enthalpy of the PVP 0.2 /PVA/Ery 2 phase change film is also larger than those previously reported flexible self-healing phase change materials listed in Table 1, which can be used to provide high thermal energy storage density and excellent temperature regulation capacity for thermal management.

DOI: 10.1016/j.co.2021.100980 Corpus ID: 239517787; Light-actuated shape memory and self-healing phase change composites supported by MXene/waterborne polyurethane aerogel for superior solar-thermal energy storage

DOI: 10.1016/j.jmat.2023.11.005 Corpus ID: 265604508; Photo-cured phase change energy storage material with photo-thermal conversion, self-cleaning and electromagnetic shielding performances via the lamellar structure strengthened by ...

This study develops an innovative approach that uses covalent and ionic crosslinking to simultaneously maintain the form-stability and self-healing capabilities of sodium acetate ...

Compared with the thermal curing process, the photocuring process has advantages such as high efficiency and less energy consumption. However, the preparation of photocurable phase change materials (PCMs) with photothermal conversion and self-cleaning properties is challenging due to the conflict between the transparency required by the ...

The objective of this paper is to evaluate the fatigue resistance and self-healing properties of asphalt binders modified with different types of additives (Styrene-Butadiene-Styrene (SBS), Glass Powder (GP) and Phase ...

Recyclable, self-healing, and flame-retardant solid-solid phase change materials based on thermally reversible cross-links for sustainable thermal energy storage ACS Appl. Mater. Interfaces, 13 (36) (2021), pp. 42991 - 43001



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@article{Liu2024SelfhealingSA, title={Self-healing sodium acetate trihydrate phase change material gel demonstrating solar energy conversion and storage for personal thermal management under static and dynamic modes}, author={Xingru Liu and Ling Wang and Pengcheng Lin and Zhongliang Huang and Ying Chen}, journal={Solar Energy Materials and ...

Elevating the Photothermal Conversion Efficiency of Phase-Change Materials Simultaneously toward Solar Energy Storage, Self-Healing, and Recyclability. Click to copy article link Article link copied! Shiwei Zhao. Shiwei Zhao. State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute of Sichuan University, Chengdu 610065, ...

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