Flame retardant phase change energy storage materials

Can a flame retardant be used in energy storage devices?
However,the high flammability and unrecyclable problems restrict their applicationsin energy storage devices (ESDs). Although it is facile to introduce a flame retardant into phase change materials to improve fire resistance,the physical blending will deteriorate the mechanical performance and thermal stability of PCMs.

Can phosphorus/ammonium-containing non-formaldehyde flame retardant be used in building energy conservation?
The development of form-stable phase change materials (PCMs) with flame retardancy and the visual thermal storage process is crucial for their application in building energy conservation. Herein, an active phosphorus/ammonium-containing non-formaldehyde flame retardant (APA) was synthesized based on the natural compound phytic acid.

What is a new flame retardance strategy for shape stabilized phase change materials?
A new flame retardance strategy for shape stabilized phase change materials by surface coating. Sol. Energy Mater. Sol. Cells 2017,170,87-94. [Google Scholar][CrossRef]Huang,Y.-H.; Cheng,Y.-X.; Zhao,R.; Cheng,W.-L. A high heat storage capacity form-stable composite phase change material with enhanced flame retardancy. Appl.

How to achieve flame retardancy properties?
Another method to achieve flame retardancy properties is surface coating. The research articles discussing surface coating included in this review study report significant positive results in terms of flame retardancy. However,the chemical and physical integrity of the protective layer are a major concern of this method.

What is a flame retardant PCM for battery modules?
A flame retardant PCM for battery modules using APP and red phosphorus(RP) was developed [35],and the experimenters conducted a comprehensive investigation on the flame-retardant properties of the materials with varying ratios of flame retardants and found that a ratio of 23/10 exhibited the best flame-retardant properties.

How does a fire resistant material affect energy storage performance?
Fire-resistant particles affect the molecular motion during the phase change process,leading to a reduction in latent heat. Therefore,adding too many flame-retardant particles will affect the energy storage performance of the material. When preparing the material,the content of functional carriers in the composite material should be considered.

Phase change materials (PCM) are one of the most important groups of materials that have been used for the storage of thermal energy [4, 5, 6]. PCM-based systems are characterized by a high energy storage density and keep a constant temperature in the heat storage process during the phase transition.

Flame retardant phase change energy storage materials

Flame-Retardant and Form-Stable Delignified Wood-Based Phase Change Composites with Superior Energy Storage Density and Reversible Thermochromic Properties for Visual Thermoregulation. Cite this: ACS Sustainable Chem. Eng. 2023, 11, 9, 3932-3943.

Phosphorus-modified hexadecanol is used to fabricate flame-retardant FSPCMs to reduce the amount of the flame retardant. The fire-retardant mechanism of the FSPCMs is inferred through residue analysis of the condensed and gas phases. The FSPCMs exhibit excellent thermal storage performance and flame retardancy.

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 ...

The development of form-stable phase change materials (PCMs) with flame retardancy and the visual thermal storage process is crucial for their application in building energy conservation. Herein, an active phosphorus/ammonium-containing non-formaldehyde flame retardant (APA) was synthesized based on the natural compound phytic acid. Then, wood ...

In this work, flame-retardant nanoencapsulated phase change materials (NanoPCMs) containing n -octadecane as the core material and poly (methylmethacrylate) (PMMA) as the shell material were successfully ...

Phase change materials (PCM) are one of the most important groups of materials that have been used for the storage of thermal energy [4, 5, 6]. PCM-based systems are characterized by a high energy storage density ...

For phase change energy storage materials, the phase change behavior is a very important parameter, ... Fabrication of flame-retardant phase-change materials for photo-to-heat conversion and flame-retardant mechanism. J Energy Storage, 84 (2024), Article 110724. View PDF View article View in Scopus Google Scholar [48] M. Li, C. Wang. Preparation and ...

Web: https://roomme.pt