

What is photothermal phase change energy storage?

To meet the demands of the global energy transition, photothermal phase change energy storage materials have emerged as an innovative solution. These materials, utilizing various photothermal conversion carriers, can passively store energy and respond to changes in light exposure, thereby enhancing the efficiency of energy systems.

How does photothermal heat release work?

This device effectively controls temperature through photothermally driven heat release under conditions as low as  $-40\text{ }^{\circ}\text{C}$  and achieves a high energy density of  $380.76\text{ J/g}$  even at  $-63.92\text{ }^{\circ}\text{C}$ . The thermal effect is primarily due to light-induced molecular isomerization, a nonradiative relaxation process.

What causes large-scale lithium-ion energy storage battery fires?

**Conclusions** Several large-scale lithium-ion energy storage battery fire incidents have involved explosions. The large explosion incidents, in which battery system enclosures are damaged, are due to the deflagration of accumulated flammable gases generated during cell thermal runaways within one or more modules.

Why is a delayed explosion battery ESS incident important?

One delayed explosion battery ESS incident is particularly noteworthy because the severe firefighter injuries and unusual circumstances in this incident were widely reported (Renewable Energy World, 2019).

Why are lithium-ion batteries causing fires and explosions?

Deflagration pressure and gas burning velocity in one important incident. High-voltage arc induced explosion pressures. Utility-scale lithium-ion energy storage batteries are being installed at an accelerating rate in many parts of the world. Some of these batteries have experienced troubling fires and explosions.

Can graphene improve photothermal conversion efficiency?

For instance, Atinafu et al. developed a graphene derived from solid sodium acetate to enhance the photothermal conversion efficiency, thermal conductivity, and energy storage capacity of PCMs. The reduction in supercooling increased the composite material's energy storage capacity by  $157.6\text{ kJ/kg}$ , which is  $101.4\%$  higher than expected.

of energy systems. Photothermal phase change energy storage materials show immense potential in the fields of solar energy and thermal management, particularly in addressing the ...

Currently, fossil fuel resources are being gradually depleted, and the world is facing a severe energy crisis. Efforts are being made to promote energy transition, enhance ...

All forms of energy follow the law of conservation of energy, by which they can be neither created nor

destroyed. Light-to-heat conversion as a traditional yet constantly evolving means of converting light into thermal ...

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Solar-to-hydrogen (STH) is emerging as a promising approach for energy storage and conversion to contribute to carbon neutrality. The lack of efficient catalysts and ...

In this work, sunlight-induced phase change energy storage microcapsules were investigated based on poly (p-phenylenediamine) (PPPD) stabilized Pickering emulsion, where ...

Metallic nanostructures are one of the most widely studied materials for photothermal energy conversion due to the surface plasmon resonance (SPR) effects [11], ...

For example, photothermal energy is susceptible to the weather, and stable power output in all weather conditions can be achieved by coupling with other heating ...

The utilization of solar energy includes photothermal, photoelectric, photobiological and photochemical conversion. Among them, photothermal is the most widely ...

Emerging phase change material (PCM)-based photothermal conversion and storage technology is an effective and promising solution due to large thermal energy storage ...

In this work, smart thermoregulatory textiles with thermal energy storage, photothermal conversion and thermal responsiveness were woven for energy saving and ...

Photothermal energy storage materials need not only high photothermal conversion efficiency, but also excellent thermal response. Therefore, the photothermal ...

Photothermal energy conversion represents a cornerstone process in the renewable energy technologies domain, enabling the capture of solar irradiance and its ...

Photothermal phase change energy storage materials (PTCPCEsMs), as a special type of PCM, can store energy and respond to changes in illumination, enhancing the efficiency of energy ...

Scale-up applications in solar energy storage of phase change materials (PCMs) are hindered by the limitation of solid-liquid leakage and the lack of light absorption ability. Porous silicon ...

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Herein, a photothermal energy-storage capsule (PESC) by leveraging both the solar-to-thermal conversion and energy-storage capability is proposed for efficient ...

The objectives of this paper are 1) to describe some generic scenarios of energy storage battery fire incidents involving explosions, 2) discuss explosion pressure calculations ...

To solve the above challenges, in this study, we explored the design of multi-layered inorganic hollow microspheres with intrinsic light absorption to encapsulate ...

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