CAs are used not only as light absorption materials, but also as supports and carriers for phase change materials due to their excellent chemical and physical properties. ... Thermal performance of sodium acetate trihydrate thickened with different materials as phase change energy storage material. Appl Therm Eng, 23 (2003), pp. 1697-1704, 10. ...

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], such as ...

Utilization of renewable energy such as solar, wind, and geothermal power, appears to be the most promising solution for the development of sustainable energy systems without using fossil fuels. Energy storage, especially to store the energy from fluctuating power is quite vital for smoothing out energy demands with peak/off-peak hour fluctuations. Thermal energy is a ...

a Concept diagram showing the layer nano-architecture--or "nanolayer"--on a sunlight-absorbing material with the inset illustrating the light-matter interactions that result in forward and ...

For the plasmonic light absorbing materials, by controlling the size, shape and composition of the material, the light absorption can be greatly enhanced due to the strong coupling oscillation between the local electromagnetic field and the incident light photons.

Concrete with smart and functional properties (e.g., self-sensing, self-healing, and energy harvesting) represents a transformative direction in the field of construction materials. Energy-harvesting concrete has the capability to store or convert the ambient energy (e.g., light, thermal, and mechanical energy) for feasible uses, alleviating global energy and pollution ...

The performance of these solar cells relies considerably on the light-absorbing material that generates electron-hole pairs through optical absorption and separates the generated charge carriers using a built-in electric field, and further acts as a medium to transport the resulting charge carriers to the corresponding electrical contacts ...

Furthermore, the addition of light-absorbing CNTs endowed the composites with the light-to-thermal energy storage capability and light-actuated shape memory effect. When compositing paraffin with PDMS silicone elastomer, the paraffin/PDMS composite displayed the switchable transparency varying with temperature [81], [82] .

Hydrogen is an ideal candidate to fuel as "future energy needs". Hydrogen is a light (Mw = 2.016 g mol-1), abundant, and nonpolluting gas. ... Hydrogen can also be accumulated by adsorption (on the solid materials) or

by absorption (in the solid materials) ("DOE Technical Targets for Hydrogen Storage Systems for Material Handling ...

Semantic Scholar extracted view of "Solar-absorbing energy storage materials demonstrating superior solar-thermal conversion and solar-persistent luminescence conversion towards building thermal management and passive illumination" by Yue Yin et al. ... Few scholars study light efficiency of solar-cell arrays in theory, while it is difficult to ...

Next, when triggered by another pulse of light, the material resolidifies and gives back the thermal phase-change energy. "By integrating a light-activated molecule into the traditional picture of latent heat, we add a new kind of control knob for properties such as melting, solidification, and supercooling," says Grossman, who is the ...

a) Schematic illustration of the solar light-assisted energy storage system, b) XRD patterns and color change of WO3 electrode before and after lithiation and delithiation, c) lithiation and ...

Light-absorbing and energy-storage materials encompass diverse substances designed for efficiency and sustainability. This inquiry reveals several pivotal elements, including: 1. Photovoltaic cells utilize semiconductors to convert solar energy into electricity, 2.

This review provides a comprehensive overview of the progress in light-material interactions (LMIs), focusing on lasers and flash lights for energy conversion and storage ...

ety of three-dimensional (3D) conducting/light-absorbing porous networkssuchasmetalfoams,carbon-basedsponges,andcarbonized aerogels are proposed as the supporting matrix of PCMs 29-38 .The3D

[1-10]. For example, advancements in energy storage sys-tems (ESSs) have led to the proliferation of portable elec-tronics such as smartphones, laptops, wearable sensors, and Abbreviations LMI Light-material interaction ESSs Energy storage systems IoTs Internet of things PZT Pb(Zr x,Ti 1-x)O 3 PET lene yh t Peoly terephthalate

Even conventional fossil fuels are the long-term storage of solar energy. ... The light-absorbing materials either directly float on water or are placed onto a porous layer with interconnected water-supplying channels. (3) Isolation systems with the solar absorbers separating from the bulk water have also been proposed to further suppress the ...

Herein, novel solar-absorbing energy storage materials constructed by solar-thermal conversion material, phase change material gel and persistent luminescence material are proposed to efficiently ...

In this progress, PCMs change from solid state to liquid state, and convert light into heat energy and stores it

while the temperature remains unchanged. This demonstrates the potential of CPCMs as energy storage materials. The light-to-thermal energy conversion efficiency i can be calculated by Eq. (1). The m is the mass of the sample, DH is ...

energy storage and release cycle and illustrates the role played by the azobenzene photoswitch as a low-concentration "dopant" (a material added to alter the properties of a substance).

It is expected that wood-derived 3D porous scaffolds prepared by alkaline periodate oxidation are able to retain the majority of cellulose skeleton and partially lignin as a ...

A good way to store thermal energy is by using a phase-change material (PCM) such as wax. Heat up a solid piece of wax, and it"ll gradually get warmer--until it begins to melt. As it transitions ...

The investigation of photothermal materials with broadband absorption is beneficial for the utilization of renewable solar energy, while the engineering of materials with ...

This study directly irradiates solar light on an electrode and evaluates the effect of solar-light irradiation on lithium-ion storage in tungsten oxide which has dual properties of ...

Bismuth-based halide perovskite and perovskite-inspired light absorbing materials for photovoltaics. ... and low exciton binding energy ... Lifetime measurements demonstrated an increased efficiency of 6.90% after 72 h storage in nitrogen atmosphere which indicated an improved stability compared to the reference device.

Soft X-ray spectroscopies are particularly relevant to probe selectively light elements in complex environment. Here, the recent advances in the characterization of light ...

This observation can be attributed to the exceptionally high light absorption coefficient induced by the as-introduced MXene nanosheets, leading to an extraordinary level of light absorption ability within the MPDWPs. ... A. Stamatiou, Biobased phase change materials in energy storage and thermal management technologies. Renew. Sustain. Energy ...

The main challenge in design of visible-light-triggered systems, including molecular switches, [21] is the fact that nonradiative transition rate constants increase approximately exponentially as the associated energy gap contracts, [22] which generally decreases the quantum yield of photoisomerization in p-extended organic photochromes absorbing visible or NIR light. [23]

The enthalpy change (DH) for the above chemical reaction is 104.4 kJ/mol, with a reaction temperature range of 400-600 °C [11].Since Wentworth first demonstrated that Ca(OH) 2 /CaO could be used for heat storage [12],this material has become the subject of considerable research.The influence of the thermophysical properties [13], thermodynamic properties [14], ...

Herein, novel solar-absorbing energy storage materials constructed by solar-thermal conversion material, phase change material gel and persistent luminescence material ...

Solar-absorbing materials and phase change materials (PCMs) are indispensable components in the above energy cycles. A superior solar-absorbing material is required to possess at least two characteristics: the high light absorption capacity across the entire solar spectrum and the high energy conversion efficiency from light to thermal energy [15].

Energy-absorbing materials are widely used in transportations, sports, and the military applications. Particularly, porous materials, including natural and artificial materials, have attracted ...