

This modification enables photoswitches that are activated by low-energy light operating in both directions . As shown in Scheme 9 and Table 6, the resulting compound 31o displays characteristic absorption bands at 402 nm and at around 300 nm, which are attributed to the dibenzoylmethanato boron difluoride complex fluorophore and the ...

Visible light activated dendrimers for solar thermal energy storage and release below 0 °C ... Wang,\*b and Haifeng Yu\*c a State Key Laboratory of Clean and Efficient Coal Utilization, Taiyuan University of Technology, Taiyuan 030024, Shanxi, P. R. China, E-mail: ying@tyut .cn ... light irradiation (520 nm, 20 mW cm<sup>-2</sup>) and (b) blue light ...

We present here a group of Azo-BF<sub>2</sub> photoswitches that store and release energy in response to visible light irradiation. Unmodified Azo-BF<sub>2</sub> switches have a planar structure with a large p-conjugation system, which hinders E-Z isomerization when in a compacted state. To address this challenge, we modified the switches with one or two aliphatic ...

This energy storage technology, characterized by its ability to store flowing electric current and generate a magnetic field for energy storage, represents a cutting-edge solution in the field of energy storage. The technology boasts several advantages, including high efficiency, fast response time, scalability, and environmental benignity.

Many reports are concerned with extracting energy from solar light and the use/storage of the converted energy. ... A low concentration of N doping can realize visible-light-activated water splitting similar to the material ...

Supercapacitors, also known as ultracapacitors or electrochemical capacitors, represent an emerging energy storage technology with the potential to complement or potentially supplant batteries in specific applications. While batteries typically exhibit higher energy density, supercapacitors offer distinct advantages, including significantly ...

In response to environmental concerns and energy security issues, many nations are investing in renewable energy sources like solar [8], wind [9], and hydroelectric power [10]. These sources produce minimal to no greenhouse gas emissions, thereby reducing the carbon footprint of the energy sector [[11], [12]]. Hydrogen, touted as a game-changer in the ...

Physical adsorption. Porous structure materials such as zeolite, silica gel, activated carbon, and activated alumina have the ability to adsorb vapors like water. ... metal hydrides, alanates, and other light hydrides ...

The earliest grid-scale energy storage technology is pumped hydroelectric storage, introduced to the grid in the 1930s. ...

The sensible heat of molten salt is also used for storing solar energy at a high temperature, [10] termed molten-salt technology or molten salt energy storage (MSES). Molten salts can be employed as a thermal energy storage method to retain thermal energy. Presently, this is a commercially used technology to store the heat collected by concentrated solar power (e.g., ...

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Superresolution microscopy is an excellent tool for imaging both materials 186 and biological systems. 187 Structural optimization of photoswitchable fluorophores 188 towards compatibility with aqueous environment 189 and activation with visible light (e. g. in spirooxazines 190 or diarylethenes 191) could expand the scope of this technology in ...

Molecular solar thermal (MOST) energy storage compounds, which absorb and store photon energy through photo-isomerization and release the energy as heat when triggered to undergo the reverse isomerization, have emerged as a prom-ising solution for harnessing and storing wasted solar energy. Various photoswitches, including fulvalene diruthenium

The better efficiency of the observed light-driven hydrogen storage is attributed to the higher temperature in the vicinity of the Au nanoparticles owing to their plasmonic effect. The concept of light activation for triggering hydrogen release or uptake in hydrogen storage materials was investigated with the aid of gold (Au) nanoparticles dispersed at the surface of ...

Thermally activated batteries, which require heat to be provided to melt the electrolyte and operate, have generally served niche applications. This work highlights some of these early battery concepts and presents a new rechargeable freeze-thaw battery, which also utilizes thermal activation, as a possibility for seasonal energy storage. This concept can allow ...

Varying the light wavelength, intensity, irradiated position, and polarization permits advanced light activated shape memory effects (SMEs). Selectively activated LASMPCs have been developed by incorporating selective wavelength triggered photothermal fillers into the SMP matrix [9], [32], [33]. Furthermore, light activated reversible SME and multi SME enhance ...

Herein, the effect of structure on pseudocapacitive properties in alkaline conditions is demonstrated through the investigation of isoelectronic oxides Ca<sub>2</sub>LaMn<sub>2</sub>O<sub>7</sub> and Sr<sub>2</sub>LaMn<sub>2</sub>O<sub>7</sub>, where the difference in ionic

radii of  $\text{Ca}^{2+}$  and  $\text{Sr}^{2+}$  leads to a change in structure and lattice symmetry, resulting in an orthorhombic Cmc structure for the former and ...

We developed red light absorbing MOST compounds based on Azo-BF<sub>2</sub> photoswitches and demonstrated that they display reversible photoswitching and energy storage in the solid state. The limited scope of exclusively visible light activated MOST compounds makes this finding unique and valuable for solar energy conversion and storage applications.

The accumulation of non-biomass wastes, including anthracite, asphalt/asphaltene, synthetic polymers, petroleum coke, and tire wastes, contributes to environmental pollution. Utilizing these waste resources as precursors for activated carbon production emerges as an economical and sustainable strategy for energy storage and ...

1. Introduction. Solar energy is distributed globally in the form of light and large amount of low temperature heat. Storage of these energy resources is imperative to their conversion into other forms of energy [1]. Thermal storage has been enabled utilizing phase change materials (PCMs) whose intermolecular interactions are altered with temperature ...

The concept of light activation for triggering hydrogen release or uptake in hydrogen storage materials was investigated with the aid of gold (Au) nanoparticles dispersed at the surface of typical hydrides including magnesium hydride ( $\text{MgH}_2$ ), lithium hydride (LiH) and sodium alanate ( $\text{NaAlH}_4$ ). Upon Xe lamp illumination, the overall temperature of the materials ...

Consequently, the advancement of energy storage technology holds immense significance in optimizing energy structures, enhancing energy efficiency, safeguarding energy security, and fostering sustainable energy development. ... Activated carbon features a porous structure, a large specific surface area (approximately  $1000\text{--}1500\text{ m}^2\text{ g}^{-1}$ ), ...

Light-activated shape memory materials are rapidly developing and widely utilized in various fields such as Micro light drive, biomedicine and space technology in the past few years since light stimulation offers greater accuracy and speed compared to other forms of stimulation. ... programming stage, energy storage stage and recovery stage ...

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