

What are persistent luminescent materials?

The persistent luminescent materials are a class of photo-luminescent materials. When excited by light irradiation, the persistent luminescent materials absorb light energy and store it in the matrix. After the excitation stops, the stored energy will be gradually released in the form of light emission, and this luminescence lifetime can last long.

Can persistent luminescent phosphors store light energy in advance?

Nature Materials 22,289-304 (2023) Cite this article Persistent luminescent phosphors can store light energy in advance and release it with a long-lasting afterglow emission.

Are luminescent materials practical?

There is a general lack of practical red persistent luminescent materials. The activation ions are mainly Eu^{2+} and the luminescent substrates are mainly aluminates and silicates, making the development of novel luminescent species very necessary.

Which light source is used to charge persistent luminescent phosphors?

As for the pumping source, ultraviolet-visible (UV-Vis) light is the most widely used source to charge persistent luminescent phosphors; however, persistent luminescent phosphors that can be charged with deep-red and even NIR light sources are highly desirable for biological applications.

What happens when a persistent luminescent material is illuminated?

When persistent luminescent materials are illuminated by ultraviolet or sun lights, the $4f^7$ electrons in the ground state of Eu^{2+} transit to excited-state $4f^6 5d^1$.

Can optical information storage be used for rare earth luminescent materials?

As we entered the 21st century, nano research on rare earth luminescent materials began to unfold rapidly. One such field is optical information storage. A brand new optical storage medium composed of UCNPs and EuSe semiconductors was prepared by Xie and coworkers [22], in which the emission spectrum was excitation wavelength dependent.

Light storage, the controlled and reversible mapping of photons onto long-lived states of matter, enables memory capability in optical quantum networks. Prominent storage media are warm alkali ...

Novel self-luminous wood composite based on PCMs with superior thermal energy storage and long afterglow luminescence (LAL) materials with excellent light energy storage is reported [37]. To our best knowledge, integration of LAL particle into PCMs to synthesize PEG based self-luminous SSPCMs for both thermal and light energy storage, have ...

Ceralume[®] is a highly engineered and patent-pending process that involves homogeneously mixing ceramic powders with high-grade Super-LumiNova[®] pigments, a luminous material renowned for its ability to store and emit light energy.

Luminescent materials are widely used in electronics and optoelectronics. From the beginning of manufacturing of high-performance light-emitting diodes (LEDs) for blue spectral region, + the idea appeared to modify them to design LEDs with another emission color and white light-emitting LEDs suitable for lighting. A possible way to solve these problems is to use ...

The development of phase change materials (PCMs)-based energy storage devices for both thermal and light energy has the potential to greatly enhance solar energy use efficiency, which is important ...

High efficient energy storage devices for both thermal energy and light energy are scarce in the development of modern society to reduce energy consumption. In this work, a novel self-luminous wood composite based on phase change materials (PCMs) with superior thermal energy storage and long afterglow luminescence (LAL) materials with excellent light energy ...

The potential for a large number of applications has stimulated the exploration of the preparation of wearable light-storing buttons. In this study, SrAl₂O₄:Eu²⁺, Dy³⁺ (SROED) was used as a long-lasting phosphorescent material, mixed with unsaturated polyester resin in proportion. A light-storing button with high stability and long afterglow time is obtained ...

This is achieved by homogeneously mixing ceramic powders with high-grade Super-LumiNova[®] pigments, a luminous material that acts like a battery for storing light energy. In dark chamber tests, a fully luminous concept watch manufactured using the Ceralume[®] technology has emitted a bright blueish light for more than 24 hours.

The luminescent materials absorb the light from any light source and then radiates it when the light source is not present. ... Terbium and Cerium molar percentages needed for luminous emission in a yttrium ... This phenomenon is possible by the storage of excitation energy in the lattice for a certain time period. 7 This category includes the ...

For light-emitting diode (LED) applications, rare earth luminescent materials with high photoluminescence quantum yields, good stabilities, and broad luminescence spectra ranging from the visible ...

Organic long-persistent-luminescent (OLPL) materials demonstrating hour-long photoluminescence have practical advantages in applications owing to their flexible design and easy processability.

This special issue covers a series of cutting-edge works on exploring novel rare earth luminescent materials and their applications in lighting, display, information storage, ...

Light-storing luminous material

It integrates ceramic powders with high-grade Super-LumiNova® pigments, a state-of-the-art luminous material that functions like a light-storing battery. During tests in a dark chamber, watches made with this technology emitted a vibrant blueish glow for over 24 hours. ... For the luminous variant, Super-LumiNova® pigments are added to the ...

Downloadable (with restrictions)! Except for the improvement enthalpy value and thermal conductivity of conventional solid-solid phase change materials (SSPCMs), expansion of additional functions other than thermal energy storage function of that has been particularly attractive. In this work, a novel self-luminous SSPCMs based polyethylene glycol have been ...

Long-afterglow rare-earth luminescent materials are one of the most important rare-earth functional materials. Among the alkaline-earth aluminates, the phosphors $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}/\text{Dy}^{3+}$ are widely used due to their excellent performance. Unlike other photoluminescent materials, they can absorb and store the energy from an external light radiation source [16].

Light-storing luminous materials generally rarely contain radioactive substances, so there are no restrictions on their use. However, they can only emit light by absorbing external light energy, and they must store enough light energy to ensure continuous "s glow. The light-storing luminescent material can be used in the tunnel of the subway ...

it can emit light again.5-12 However, the light-storing material itself cannot be directly used as an end product, and must be combined with other materials to be an industrial raw material for application. Based on the excellent performance of light-storing materials, researchers have developed light-storing fibers, light-storing coat-

8-10H Acrylic light storing film Product name: Acrylic light storing film Material: Acrylic Luminous time: 4-6 hours The luminous film surface is made of new acrylic material, which is non tear able and has strong weather resistance. It can be used for screen printing and ink-jet printing. It is yellow green in the daytime, and emits green light in the dark place.

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Phosphorescent materials emit light by storing energy in internal energy traps (electrons or holes) after being excited by irradiation [20], [50]. ... PPRMs is weak due to the low transmittance of black asphalt, which make it difficult to meet the requirements of self-luminous materials. Thus, the difficulty of asphalt-based PPRMs is how to ...

The buddha-light jade is made from the base material by adding light-storing luminous materials of different amount through the steps of melting, casting molding and annealing treatment. The synthetic jade base

material of the invention has real jade sense characteristics, thereby being capable of substituting for natural jade.

In this Perspective, we give an overview of luminescent materials used for lighting and display applications with a specific focus on inorganic phosphors, quantum dots, ...

Additionally, this material releases the energy as brightly glowing light when illuminated. Light-storing luminescent materials with excellent storage ability of luminous energy, long-lasting energy-release duration, and persistent properties can be utilized in architecture, decoration, medical treatment, safety protection, and other ...

Another drawback of light-storing luminous materials is the brightness is not enough. Photoluminescent storage luminous powder is a luminous powder after being irradiated by natural light, daylight, ultraviolet light, etc., the light energy is stored and then slowly released in the form of fluorescence after stopping light irradiation, so at ...

Luminous materials ... [91] prepared self-luminous asphalt concrete by replacing part of aggregates with energy-storage luminous particles. Results showed that the afterglow brightness of specimens at 1h was 2cd after 10 min of standard light source irradiation, and specimens could emit light for more than 12h with high afterglow brightness ...

Because the appearance of light-storing and emitting material, many plastics that have lighting function are constantly come into market. Many luminous rigid plastics goods receive an acclaim as electric switch, socket, telephone casing, clock and watch shell, various ornaments, art ware etc. These are plastic products luminous generally be with light-storing and emitting material ...

Acting like a battery for storing light energy, this luminous material makes the ceramic cases glow blueish in the dark for more than 24 hours. Using Ceralume[®], IWC Schaffhausen has manufactured its first fully luminous ceramic concept watch. ... Super-LumiNova[®] is a high-tech ceramic compound that behaves like a light storage battery. The ...

Persistent luminescent phosphors can store light energy in advance and release it with a long-lasting afterglow emission. With their ability to eliminate in situ excitation and store energy for ...

By using a p-type host less reactive to oxygen and tuning the donor-acceptor energy gap, our amorphous blends exhibit persistent luminescence stimulated by visible light ...

In fact, the self-luminous working principle of these MPL@PCM composites is mainly based on the storage capacity of the MPLs and its correlated persistent luminescence as an inner light source for the PCMs, making it possible to generate a continuous self-induced photocatalytic activity when the external irradiation source is off.

In luminous research regions, the DFT calculation finds wide application in revealing the luminescence mechanism and designing luminous materials. In this chapter, we first introduce the first-principles calculation foundation theory, related software, and the luminescence physics processes.

materials-based PCMs also of interest since they can slow down the thermal energy release and save the output thermal (Kishore et al. 2021). Luminescence materials absorb light, store energy, and subsequently release light in a dark environment; therefore, they have been extensively investigated. These materials are commonly employed in a

Generally, the luminous fibers prepared using aluminate systems are ideal as light-storing functional materials with outstanding afterglow properties, including UV radiation resistance ...

SAO is a light-storage-light-release-type material. A force excites a piezoelectric field, the electrons in traps are released and undergo stimulated radiation before producing ML. At room ...

The recycling luminous materials $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}, \text{Dy}^{3+}$ is a kind of long afterglow phosphor, prepared based on the alcoholysis of luminous polyester fabric, which has excellent ...

According to the gelled material, light-emitting concrete includes cement-based, asphalt-based, and polymer-based. 16.3 Mechanisms and Properties of Light-Emitting Concrete In order to make concrete absorb and convert solar energy, the common way is take advantage of luminous materials, such as luminous aggregates and phosphor powders.

This paper mainly studies the preparation technology and properties of energy-storing luminescent plastic. The colorless and colored energy-storing self-luminous plastics were prepared by using epoxy resin as the carrier, adding long-acting noctilucent powder into epoxy resin to fully mix and adding phenol-4-sulfonic acid to cure.

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