Solar thermal conversion film

Are ultra-black films suitable for solar-thermal conversion?
Large-sized ultra-black films with a light trapping structure were prepared. A low reflectivity of <1.0% was measured in the visible region. A high solar-thermal conversion efficiency of 88.37%was observed. The films could maintain the efficiency even under extreme conditions.

What are the solar-thermal conversion efficiencies of CBF 1000 / T/P/PA composite PCM films?
The results exhibited that the solar-thermal conversion efficiencies of CBF 1000 @T/P/PA composite PCM films were 31.42 %,76.18 % and 89.81 %at solar radiation intensities of 75 mW/cm 2,100 mW/cm 2 and 125 mW/cm 2,respectively.

How to calculate solar-thermal conversion storage efficiency?
The solar-thermal conversion storage efficiency (? S-T) can be defined as follows: [,,]. (7) - ? S - T % = m ? ?Hm,com P ? S ? ?t × 100 %where m is the mass of CBF 1000 @T/P/PA,?H m,com is the enthalpy of the sample,P is the intensity of solar radiation,S is the surface area of the sample,and ?t is the phase transition time.

Does MC film improve photothermal conversion and heat utilization efficiency?
This paper describes a film composed of hybrid nanofibers of a metal-organic framework layered on cellulose (MC film),resulting in both high photothermal conversion and heat utilization efficiency.

Does photothermal conversion reduce the efficiency of STEC materials?
In fact,the efficiency of current STEC materials is limitedby the latter procedure,although the efficient photothermal conversion is often achieved. The main restriction of the effective utilization of the heat by the materials lies in the excessive thermal loss or exchange.

Is solar-thermal conversion efficiency higher than other materials?
Obviously,the solar-thermal conversion efficiency of the present film (88.37%) is higher than most solar-thermal materials reported so far (Fig. 9 c and Table S1 in Supporting Information). However,this value is lower than those for a few other materials,such as vertically aligned carbon nanotube arrays,Ti 2 O 3 and multilayer PPy nanosheets.

Experimental results show that the diffuse reflectance can be controlled to be <1.0% in the visible region (400-800 nm) for ultra-black absorption, leading to an impressive solar-thermal conversion efficiency of 88.37%. Meanwhile, the ultra-black film can be prepared by the etching method to have large sizes, large flexibility, and a diffuse ...

The films show desirable solar-thermal conversion and efficient electro-thermal storage performance in a short time. Abstract. Phase change materials (PCMs) are widely used in a range of energy storage applications due

to high latent heat absorption and release capacities during phase change processes. There is still a lot to be done to resolve the inherent leakage, ...

Based on the high mechanical strength and flexibility of the MC film, a solar-driven artificial muscle was designed to demonstrate a highly efficient pathway of solar thermal to mechanical work conversion. Furthermore, the efficient utilization of solar heat was exhibited by an MC film-based solar-driven water desalination system, taking ...

The results exhibited that the solar-thermal conversion efficiencies of CBF 1000 @T/P/PA composite PCM films were 31.42 %, 76.18 % and 89.81 % at solar radiation intensities of 75 mW/cm 2, 100 mW/cm 2 and 125 mW/cm 2, respectively. The CBF 1000 @T/P/PA PCM film presented favorable solar-thermal conversion efficiency and performance ...

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Benefiting from the oriented plasmonic particle-in-cavity configuration, the ...

ABSTRACT: Developing materials for efficient solar thermal energy conversion (STEC) is currently a promising field in energy research. Traditional STEC materials such as carbon and plasmonic nanomaterials have limited efficiency of solar heat utilization, despite their high photothermal conversion efficiency. This paper describes a film

The hybrid film exhibits ultra-high solar absorbance (~99%), low thermal ...

Therefore, the optimal SBTP film exhibits high thermal enthalpy of 145.1 J g -1, enthalpy efficiency of over 94%, robust shape stability and low leakage of <1.2%. It also displays high photothermal conversion of over 80 °C, photothermal storage of 394 s g -1 and excellent stability.

Solar thermal generates energy indirectly by harnessing radiant energy from the sun to heat fluid, either to generate heat, or electricity. To produce electricity, steam produced from heating the fluid is used to power generators. This is different from photovoltaic solar panels, which directly convert the sun"s radiation to electricity.

Here, we report that black photothermal materials elevate solar heating temperatures across high solar

absorption and low infrared radiation. Fe3O4 nanostructure films can be heated to 350 °C under light irradiation, and ...

ABSTRACT: Developing materials for efficient solar thermal energy conversion (STEC) is ...

Benefiting from the oriented plasmonic particle-in-cavity configuration, the Janus films effectively convert sunlight into heat, trap the heat within their micrometer-depth structure, and facilitate its transfer along the direction of the nanostructure orientation.

The hybrid film exhibits ultra-high solar absorbance (~99%), low thermal conductivity, and excellent light-to-heat conversion capacity. The temperature of the hybrid film increases from...

Experimental results show that the diffuse reflectance can be controlled to be ...

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