Solar evaporation energy storage

Benefiting from the thermal energy storage capacity of the prepared FSPCMs, the FSPCM-integrated solar vapor generator can store the extra energy of the sun in the daytime and achieve continuous ...

Encouragingly, recent results opened up new opportunities for fast and energy-efficient solar water evaporation ... Energy Storage Mater. 18, 429-446 (2019). Article Google Scholar

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

The solar spectrum primarily encompasses the ultraviolet (UV) region (300-380 nm), the visible region (380-760 nm), and the near-infrared region (760-2500 nm), constituting 3%, 45%, and 52% of the solar energy, respectively (Fig. 1 b) [19].An ideal solar-driven evaporation system should exhibit exceptional absorption across the entire solar spectrum, ...

The developed solar evaporator possesses excellent evaporation rates (2.13kgm 2 h 1) under 1kwm 2 and effectively recovers the energy being conducted toward the downward matrix and overcomes the limitation of evaporation structure (0.85kgm 2 h 1) under intermittent solar irradiation (stored PCM energy). The all-weather solar evaporator ...

Biomass-derived porous carbon aerogels for effective solar thermal energy storage and atmospheric water harvesting. Sol. Energy Mater. Sol. Cells, 262 (2023 ... Mildly peeling off and encapsulating large mxene nanosheets with rigid biologic fibrils for synchronization of solar evaporation and energy harvest. ACS Nano, 16 (2022), pp. 8881-8890 ...

The reported evaporation rate of 2.4 kg/m 2-h for pure water, and steady-state evaporation rate of 2.2 kg/m 2-h for the brine under one sun are higher than most previously reported values and actually correspond to a solar thermal evaporation efficiency greater than 1 (corresponding to an evaporation rate of around 1.87 kg/m 2-h under one sun 5).

Solar-driven interfacial evaporation (SDIE) is a promising freshwater harvesting strategy rich in energy, including solar and water energy. Through comprehensive energy utilization in the SDIE system, high-efficiency water and electricity co-generation (WEG) hybrid systems can be established to optimize the existing water-energy nexus.

Solar-driven interfacial evaporators can locate absorbed solar energy at the water/air interface of photothermal materials without requiring any mechanical input, promoting the improvement of photothermal conversion efficiency. 1 In addition to producing fresh water, solar evaporators can induce the directional migration of

hydrated ions during evaporation, ...

DOI: 10.1021/ACSSUSCHEMENG.0C08521 Corpus ID: 233522717; Solar Evaporation-Based Energy Harvesting Using a Leaf-Inspired Energy-Harvesting Foam @article{Park2021SolarEE, title={Solar Evaporation-Based Energy Harvesting Using a Leaf-Inspired Energy-Harvesting Foam}, author={Jun Hong Park and Sung Ho Park and Jaehyeong Lee and Sang Joon Lee}, ...

Harvesting solar energy for efficient photothermal conversion and steam generation over solar evaporators is particularly significant in the context of comprehensive solar utilization toward solving the global shortage of fresh water. Herein, a flexible Ni-based metal-organic framework composite (NMC) with h

Interfacial solar evaporation, which captures solar energy and localizes the generated heat for evaporating water molecules, is regarded as an important emerging strategy for solar energy ...

Because the productivity of clean water depends on solar energy utilization or storage of heat, phase change material (PCM)-based energy storage systems can be applied for solar evaporation. A solar-driven PCM-integrated interfacial evaporation system (SPIIE) was demonstrated by Gong et al. (Fig. 5 A) [91].

Solar evaporation is an attractive technology that combines the two most abundant resources on Earth: solar energy and water. It has enabled an array of emerging applications, including contaminated water purification, sea water desalination, electric generation, steam sterilization, and fuel production.

In this work, a split solar evaporator was constructed by using a heat collection module consisting of a metal dovetail cavity and a phase change energy storage material, and a distillation module including a motor-driven brush combined with a gridded evaporation interface.

The need for water can be seen in many aspects of our daily lives. It is used for drinking, washing, cooking, and cleaning. Water is an essential and invaluable resource that maintains an unceasing demand, warranting prudent conservation efforts. In the present experimental investigation, sensible heat energy storage and nano-enhanced latent heat ...

During the evaporation process, most of the solar energy is converted by the absorber into thermal energy for heating the air-liquid interface to enhance evaporation. ... [15] and Wu et al. [80] used a water storage evaporation strategy that detaches the SDIE unit from the bulk water. As in Fig. 6 (c), that is, after absorbing enough water ...

Three-dimensional solar steam evaporators with efficient water purification performance have received increasing attention recently. Herein, elastic polymer covalent organic frameworks (PP-PEG ...

Bifunctional polypyrrole-based conductive paper towards simultaneous efficient solar-driven water evaporation and electrochemical energy storage. Jiahong Zhang, Pengfei Wang, Yulian Chen, Xiaojiang Mu,

Xiaoyang Wang, Sakae Tanemura, Jianhua Zhou, Lei Miao ... but also provides new design inspiration for high-efficiency flexible electrochemical ...

The solar evaporator possesses excellent evaporation rates (2.13 kg m-2 h-1) along with 93% solar-to-vapor conversion efficiency under 1 kw m-2 solar irradiation owing to its minimum ...

Energy storage; Materials for energy and catalysis ... Solar evaporation -- leveraging solar energy to concentrate Li through a series of evaporation and precipitation steps -- has been ...

Solar evaporation also demonstrates great potential for converting solar energy to other forms of energy, such as chemical energy (via fuel production) and mechanical energy. 15, 161, 162 In a study led by Grimes and co-workers, 15 nitrogen-doped titanium dioxide nanotube arrays were used to photocatalytically convert CO 2 and water vapor into ...

By the combination of photothermal conversion and photothermal energy storage, the as-prepared solar steam evaporator achieves a high evaporation rate of 2.62 kg m?² h?¹ and excellent solar ...

As a control, the evaporation rates of the 3D SR with pure water as the source water under one-sun illumination and in the dark were measured to be 2.4 kg m -2 h -1 and 0.8 kg m -2 h -1, respectively, confirming that the solar evaporation performance of the 3D SR is comparable to the state-of-the-art 3D-shaped solar steam generators. 22-24 The high ...

Solar energy systems, with minimal or no need for external energy sources, have garnered industry interest, particularly in the context of ultra-high solar water evaporation, which has potential applications in ...