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Solar energy composite application system

Overview

In this review, we dive into the use of composites in various solar applications, including photovoltaic systems, solar collectors, and thermal energy storage (TES) solutions.Can solar-thermal phase change composites harness solar energy?

To clarify future research directions, this study first analyzes the heat transfer process of solar-thermal conversion and then reviews solar-thermal phase change composites for high-efficiency harnessing solar energy. The focus is on enhancing heat absorption and conduction while aiming to suppress reflection, radiation, and convection.

Can mineral-based composite PCMS be used for solar energy storage?

Using minerals as a substrate to prepare mineral-based composite PCMs is a primary solution to the leakage issue . Moreover, to fully harness solar energy, composite PCMs can be endowed with good solar–thermal conversion properties, converting solar radiation into thermal energy for storage.

How efficient are composite phase change materials?

Composite phase change materials attain 97.1 % solar-thermal conversion efficiency. Phase change materials have broad applications in thermal management, but their applications in new energy conversion and storage are limited due to low solar-thermal conversion efficiency and leakage issues.

Which composite phase change material is suitable for thermal energy storage cement-based composites?

Xu, B.; Li, Z. Paraffin/diatomite/multi-wall carbon nanotubes composite phase change material tailor-made for thermal energy storage cement-based composites. Energy 2014, 72, 371–380. [Google Scholar] [CrossRef] Liu, S.; Yang, H. Composite of Coal-Series Kaolinite and Capric–Lauric Acid as form-Stable Phase-Change Material.

Are solid-liquid PCMs suitable for solar energy storage?

Furthermore, solid–liquid PCMs face two key issues during their practical use: first, after absorbing heat, the phase change material becomes a liquid and may leak during its use; second, phase change materials generally lack good solar–thermal conversion performance, which severely limits their application in solar energy storage.

Can a phase change material based energy storage technology improve solar energy utilization?

Authors to whom correspondence should be addressed. Solar energy, the most promising renewable energy, suffers from intermittency and discontinuity. Phase change material (PCM)-based energy storage technology can mitigate this issue and substantially improve the utilization efficiency of solar energy.

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