

# **Intelligent phase change energy storage device**





## Overview

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Can artificial intelligence be used in phase change material energy storage?

This study provides a comprehensive review of the utilization of artificial intelligence (AI) technology in phase change material (PCM) energy storage. The review primarily focuses on its application in solar thermal utilization systems, electric vehicle/electronic device thermal management systems, and building energy efficiency systems.

What is phase change energy storage technology?

Phase change energy storage technology is based on phase change energy storage materials as the basis of high technology, phase change materials Phase change latent heat is large, much larger than the apparent heat energy storage density.

Are phase change materials a problem in thermal energy storage?

Learn more. Conventional thermal energy storage systems employing phase change materials (PCMs) intrinsically lack capabilities for real-time state monitoring, leading to unpredictable energy storage status and performance deficiencies in meeting the precision thermal requirements of the Internet of Everything.

Are phase change thermal storage systems better than sensible heat storage methods?

Phase change thermal storage systems offer distinct advantages compared to sensible heat storage methods. An area that is now being extensively studied is the improvement of heat transmission in thermal storage systems that involve phase shift . Phase shift energy storage technology enhances energy efficiency by using RESs.



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### [Phase Change Materials in Thermal Energy Storage: A ...](#)

Feb 23, 2025 · The review aims to direct future research directions and foster sustainable, efficient energy storage technologies for contemporary energy management and conservation.

### **Thermoresponsive hydrogels incorporating phase-change energy storage**

Jun 25, 2025 · Combining phase-change materials with thermally responsive hydrogels integrates the high water content and biocompatibility of hydrogels with the superior thermal energy ...



### **Research on the performance of phase change energy storage devices**

Apr 28, 2025 · This device is a spherical encapsulated paraffin phase change heat exchanger device (stainless steel shell diameter: 80mm),By conducting thermal storage and release ...

### **The contribution of artificial intelligence to phase change ...**

Jan 1, 2025 · This study provides a comprehensive review of the utilization of artificial intelligence (AI) technology in phase change material (PCM) energy storage. The review primarily focuses ...



[Thermoresponsive hydrogels incorporating ...](#)

Jun 25, 2025 · Combining phase-change materials with thermally responsive hydrogels integrates the high water content and biocompatibility of ...



[Intelligent phase change materials for long-duration ...](#)

Aug 6, 2024 · In a recent issue of Angewandte Chemie, Chen et al. proposed a new concept of spatiotemporal phase change materials with high super-cooling to realize long-duration ...



[Ultra-Dense Bottlebrush Dynamic Phase Change Polymer ...](#)

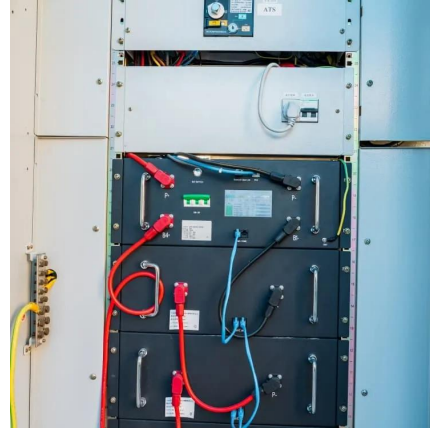
Sep 18, 2025 · Conventional thermal energy storage systems employing phase change materials (PCMs) intrinsically lack capabilities for real-time state monitoring, leading to unpredictable ...





## [Phase Change Materials and Thermal Energy Storage](#)

Jul 16, 2025 · In recent years, advancements in both material formulation and integration strategies have enhanced the capacity, stability, and cost-effectiveness of PCMs.



### **Intelligent phase change materials for long-duration thermal energy storage**

Aug 7, 2024 · In a recent issue of *Angewandte Chemie*, Chen et al. proposed a new concept of spatiotemporal phase change materials with high supercooling to realize long-duration storage ...

### **Recent Advances in Phase Change Energy Storage Materials: ...**

Jan 22, 2025 · PCESMs are employed in the construction industry for passive solar heating, thermal regulation, and energy-efficient building designs. They facilitate effective thermal ...



### [Toward high-energy-density phase change thermal ...](#)

Three methods for increasing the phase-change thermal storage density can be concluded from previous studies, i.e., chemical modification, nano-modification/confinement, and ...



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