

Energy storage nowadays is a cumbersome process that needs to be exploited for its best use. This review paper discusses the challenges of efficiently utilizing energy storage and proposes ...

The CPCMs can maintain its microstructure stable during energy storage and release processes as the CSMs have high wettability and interfacial energy, which could significantly restrict the swelling caused by the TCEMs and effectively encapsulate the liquid PCMs [12, 13]. During the manufacturing process, the liquid PCMs wet the CSMs and spread ...

In order to realize the collaborative exploitation of deep mineral resources and geothermal energy, the concept of phase-change heat storage backfill is proposed, namely, when backfill mining is conducted, a certain dosage of PCM (Phase Change Material) is added into backfill slurry, under the condition of satisfying the requirements of ...

In view of the high temperature problem faced by mining activities, the coordinated mining of ore deposit and geothermal energy is a solution in line with the concept of green mining. The layered backfill body with finned double-pipe heat exchanger continuously exchanges heat with the surrounding thermal environment, which plays an effective role in ...

In view of high ground stress, high geothermal temperature, and thermal hazard during deep mineral resource exploitation, the concept of phase-change heat storage backfill was put forward in this study. Further, the corresponding technical system was constructed and the main content involved in technical system, which is the optimized proportion of the backfill ...

The heat absorbed and released during the phase transition is much larger than the sensible thermal energy storage. Generally, when a phase change material transforms from one phase state to another, a large amount of heat is absorbed or released in the environment. During phase change, the temperature remains basically constant.

Phase Change Material (PCM) can absorb or release latent heat at a constant temperature by phase transition with many advantages, such as huge storage capacity, excellent chemical ...

Energy storage technology has greater advantages in time and space, mainly include sensible heat storage, latent heat storage (phase change heat storage) and thermochemical heat storage. The formula (1-1) can be used to calculate the heat [2]. Sensible heat storage method is related to the specific heat capacity of the materials, the larger the ...

Phase change materials effect on the thermal radius and energy storage capacity of energy piles: experimental and numerical study Int. J. Thermofluids, 10 (2021), Article 100094, 10.1016/j.ijft.2021.100094

The spherical paraffin microcapsules with phase-change temperature of 30°C and particle size of 5-10 mm, which use polymethyl methacrylate as coating material and paraffin as phase change medium, were selected as PCM, directly added into backfill materials and stirred, mixed uniformly with water for preparing backfill slurry, taking cement ...

In recent years, phase change materials (PCMs) have attracted considerable attention due to their potential to revolutionize thermal energy storage (TES) systems. Their high latent heat storage capacity and ability to store and release thermal energy at a constant temperature make them promising candidates for TES applications.

Inspired by these achievements, Zhang et al. proposed adding Phase-Change Materials into the backfills, preliminarily forming the conceptual and technical system of phase-change heat storage ...

The gangue used in this study was taken from China Inner Mongolia Energy Co., Ltd. The maximum particle size of the gangue is less than 25 mm, and the proportion of the gangue with a particle size of less than 5 mm is 60%. ... Li H, Zhang Z (2021) Pore structure and strength deterioration mechanism of phase change energy storage backfill. Rock ...

Its main composition is SiO₂ (content up to 85%), and its apparent density and average particle size are of 2650kg/m³ and 0.15mm, respectively. The cement used in this paper was Portland cement (P.O 42.5) produced by the China United Cement Corporation. ... Strength and thermal performance of phase change energy storage backfill. J. Harbin ...

Phase change materials (PCMs) can alleviate concerns over energy to some extent by reversibly storing a tremendous amount of renewable and sustainable thermal energy. However, the low ...

1. Introduction. Ground source heat pump systems offer an attractive approach for air conditioning using rock and soil at shallow depth as an energy storage body, and the technology is promoted because of its green and energy-saving characteristics [1]. As the heat exchange medium between the buried pipe and the surrounding geological formations, the ...

Hasan [15] has conducted an experimental investigation of palmitic acid as a PCM for energy storage. The parametric study of phase change transition included transition time, temperature range and propagation of the solid-liquid interface, as well as the heat flow rate characteristics of the employed circular tube storage system.

For the temperature curves of both materials, the temperature change in the backfill area ($R \leq 0.075$ m) of the novel backfill material (From 24.5 °C to 21 °C) during the system shutdown period (10-24 h) is smaller than that of the traditional backfill (From 28 °C to 20.4 °C) since SSPCM has more

latent heat storage than traditional ...

As a latent thermal storage material, phase change materials (PCM) is based on the heat absorption or release of heat when the phase change of the storage material occurs, which can provides a greater energy density. and have already being widely used in buildings, solar energy, air conditioning systems, textiles, and heat dissipation system ...

MgO based composite phase change materials for thermal energy storage: The effects of MgO particle density and size on microstructural characteristics as well as thermophysical and mechanical ... Recent advances on thermal conductivity enhancement of phase change materials for energy storage system: A review. Int J Heat Mass Transf, 127 ...

The challenge of high temperatures in deep mining remains harmful to the health of workers and their production efficiency. The addition of phase change materials (PCMs) to filling slurry and the use of the cold storage function of these materials to reduce downhole temperatures is an effective approach to alleviate the aforementioned problem. ...

Energy storage materials e.g. phase change materials (PCMs) have been utilised in ground source heat pump systems (GSHP's), in the applications of boreholes and geo-energy piles (GEP). ... The LECA used in the experiment has a particle size ranging from 4 mm to 10 mm and a bulk density of 500 kg/m³, as shown in Fig. 2. Download ... "Research ...

Phase change energy storage plays an important role in the green, efficient, and sustainable use of energy. ... A single particle or drop (core material) of a solid or liquid PCM is coated with a ...

This study can provide theoretical guidance for a phase-change heat storage backfill, as it has an important significance for the collaborative exploitation of mineral resources and geothermal energy.

At present, phase change materials have been added into the envelope to improve the thermal storage performance of envelope in building industry [21], [22], many scholars have conducted the researches on thermal and mechanical properties of building envelope with phase change materials [23], [24], [25] hdezi et al. [26] studied the thermal, mechanical and ...

In the context of dual-carbon strategy, the insulation performance of the gathering and transportation pipeline affects the safety gathering and energy saving management in the oilfield production process. PCM has the characteristics of phase change energy storage and heat release, combining it with the gathering and transmission pipeline not only improves ...

Although the large latent heat of pure PCMs enables the storage of thermal energy, the cooling capacity and storage efficiency are limited by the relatively low thermal conductivity ($\sim 1 \text{ W/(m} \cdot \text{K)}$) when compared to

metals ($\sim 100 \text{ W/(m}^2 \text{ K)}$). 8, 9 To achieve both high energy density and cooling capacity, PCMs having both high latent heat and high thermal ...

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