

European Solar Energy Storage

Combined slag energy storage mechanism



Overview

In sensible heat storage, copper slag, with its low cost and high thermal stability, is suitable as a storage material. After appropriate treatment, it can be combined with other materials to produce composite phase change energy storage materials, thus expanding its role into latent heat storage. Is slag a potential heat storage material?

In this paper, the microstructures, thermal properties, wear resulted from the heat expansion and cold contraction of the slag with storing and releasing process of two EAF slag samples were addressed. The results revealed that slag is a potential heat storage material.

How can high-efficiency utilization of high-temperature molten steel slag be achieved?

This paper proposes a method for high-efficiency utilization of high-temperature molten steel slag with three stages and three media, introducing the technical route and equipment as well. The heat recovery efficiency and exergy efficiency are obtained through the calculation of mass balance and energy balance.

Can steel slag be used for cogeneration?

When the waste heat stored in steel slag is used for cogeneration, the theoretical heat recovery rate can reach 83.98 pct, and the exergy efficiency of the overall system is 38 pct. The normal-temperature solid steel slag produced by the process is easy for iron selection and subsequent high value-added utilization.

How molten steel slag is cooled?

The molten steel slag is fully cooled through three-stage heat exchange, and the heat in it is fully recovered. This paper introduces the basic principles of the process route and the equipment. The heat recovery efficiency and exergy efficiency are also calculated through mass balance and energy balance.

How much heat can be recovered from steel slag?

When the waste heat stored in the steel slag is converted for electric energy, the theoretical heat recovery rate can reach 24.49 pct, and the exergy efficiency of the overall system is 33.83 pct.

Why is solidification of steel slag important?

The solidification of steel slag in this process consumes a large amount of CO₂ so that the free calcium oxide (f-CaO) in the steel slag is fixed, which is more conducive to subsequent utilization, thereby achieving the purpose of energy saving and emission reduction.

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Preparation and performance of a coal gasification slag

Coal gasification slag (CGS) and Fe-modified CGS (FGS) were employed to remediate cadmium (Cd) and arsenic (As) in co-contaminated agricultural soils. Adsorption ...

Waste coal gasification fine slag disposal mode via a promising

Coal gasification technology is an important starting source for the clean conversion and utilization of coal. Gasification fine slag (GFS) is the waste produced in the coal ...



Utilization of steel slag in air pollution and

This paper reviews the use of steel slag in addressing pollutants such as SO₂, NO_x, VOCs, and greenhouse gas (CO₂), detailing the underlying reaction mechanisms and ...

The characterization and mechanism of carbonated steel slag ...

Steel slag can be applied as a promising carbon fixing material. This paper mainly explored the characterization and carbonation mechanism of steel sl...



Using steel slag and fly ash solid wastes to fabricate ceramics ...

Developing low-cost phase change composites (PCCs) with high performance is of significant importance in thermal energy storage. Herein, four PCCs were prepared with ...

Cyclic performance characterization of a high-temperature ...

A thermocline hybrid sensible-latent heat storage system is one of the promising solutions to avoid the challenges encountered by the two storage techniques to what extent ...



Comparative analysis of carbonation strengthening mechanisms ...

Maximizing the use of solid wastes to replace energy-intensive cement while maintaining the comparable mechanical properties is a promising strategy for developing ...



Coal gasification slag derived mesoporous carbon-silicon-based ...

Coal gasification slag derived mesoporous carbon-silicon-based carrier for enhancing energy storage performance of phase change materials



Carbon dioxide sequestration through steel slag carbonation: ...

The direct carbonation of steel slag has emerged as a promising approach for carbon dioxide (CO₂) utilization and sequestration, holding potential for...

Synergistic gas-slag scheme to mitigate CO₂ ...

The thermal energy carried by the slag, which accounts for 10-15% of the total energy input in the steel industry 21, 22, is currently underused.



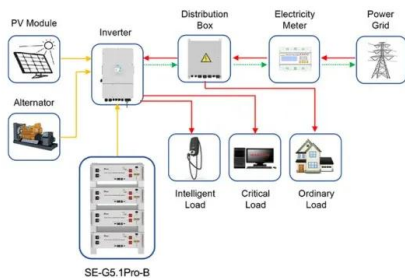
Understanding the mechanism of CO₂ mineralization and carbon

Understanding the mechanism of CO₂ mineralization and carbon sequestration performance in carbide slag: Effects of liquid-solid ratio and gas flow rate



Thermal properties and friction behaviors of slag as energy storage

The wear resulted from heat expansion and cold contraction of slag with storing and releasing energy process was addressed. The results revealed that slag is a good ...



Application scenarios of energy storage battery products

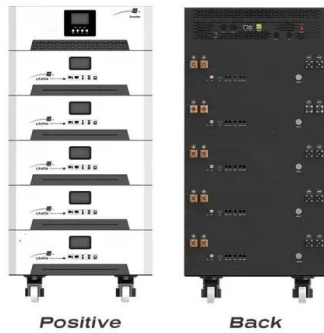
Research frontier of steel slag recycling in carbon emission ...

Metallurgical slag is a waste or by-product of the metallurgical process, and its improper disposal can pose negative environmental impacts, including groundwater and soil ...

Preparation and characterization of steel slag-based low, ...

Preparation and characterization of steel slag-based low, medium, and high-temperature composite phase change energy storage materials





Carbon capture and storage technology by steel-making slags: ...

From the perspective of circular economy, steel-making slag as carbon dioxide storage material has good economic and environmental value [14]. Steel-making slag as ...

Non-Ferrous Metal Smelting Slags for Thermal Energy Storage: A ...

This study comprehensively sums up the composition and fundamental characteristics of metallurgical waste slag. It delves into the application potential of non-ferrous ...

Sample Order
 UL/KC/CB/UN38.3/UL



Self-compensation and attenuation mechanisms of carbide slag in

This study examined the characteristics of cyclic heat storage (dehydration) and heat release (hydration) of carbide slag by establishing a multicycle thermochemical heat ...

A hierarchical full-component utilization strategy for steel slag

To promote the efficient use of steel slag in renewable energy sources, this study innovatively proposes a strategy for whole-component hierarchical utilization of steel slag to synergistically ...



Thermal properties and friction behaviors of slag as energy ...

It is proposed that slag is suitable for energy storage in CSP plants, however, little has been studied in this field. In this paper, the thermal stability, specific heat capacity, thermal ...

Three-Stage Method Energy-Mass Coupling High-Efficiency

?2005 ?????????????????????? (Presidential Early Career Awards for Scientists and Engineers);????????????????????? (Early Career ...



Preparation of phase-change material by solid waste: ...

In addition, the morphology, phase composition, phase change behavior, thermal stability and thermal reliability of PEG/steel slag composites were investigated by a series of ...

Preparation and characterization of modified steel slag-based ...

In order to promote the resource utilization in steel slag and reduce the environmental hazards caused by steel slag, a steel slag-based composite phase change ...



Microbial-induced mineral carbonation: A promising approach for

Steel production, known for its high energy consumption and significant carbon emissions, accounts for approximately 7-9% of global anthropogenic CO₂ emissions. Beyond ...

Modifying and Testing Steel Slag for Thermal Energy Storage

Project Abstract Reducing the amount of steel slag (wastes from steel production) that is thrown to waste to the environment and repurposing it helps reduce the ...



Study on CaO-based materials derived from steel slag for solar ...

In order to tackle these problems, we impregnated steel slag with acetic acid and doped Mn to create a novel CaO-based energy storage material. Thermogravimetric ...



Thermochemical Energy Storage Performances of ...

To achieve thermal energy storage/release via multicyclic calcination/carbonation, steel slag-derived CaO-based thermochemical energy storage composites were produced via the low-cost and easily ...



Self-compensation and attenuation mechanisms of carbide slag in

Utilizing industrial solid waste carbide slag for thermochemical heat storage presents an inexpensive and high-energy-storage-density solution with potential industrial applications. ...

Mechanism analysis of microwave-carbonation solidification for ...

This study proposes an innovative strategy for compacting carbide slag-based low-carbon bricks (CS-LCB) through a combination of microwave and carbonation curing, ...





All-solid-waste-derived CaO-based sorbents for

Graphical abstract Coal fly ash (CFA)-stabilized carbide slag-derived CaO-based sorbents feature superior carbonation characteristics, stable CO₂ cyclic uptake and ...

Multiscale analysis of fine slag from pulverized coal gasification in

Fine slag (FS) is an unavoidable by-product of coal gasification. FS, which is a simple heap of solid waste left in the open air, easily causes environmental pollution and has a ...



Hydration Characteristics and Microstructure of Alkali-Activated Slag

Method (1) is widely used because the alkali activator and slag can be mixed together uniformly and certain active points on the surface of the slag can adsorb certain alkali ...

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