

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

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 low resource utilization rate, thereby restricting the development of energy-saving coal gasification technologies. The multiscale analysis of FS performed in this study indicates typical grain size ...

The concept of mineral carbonation for reducing CO<sub>2</sub> emissions was first proposed by Seifritz in 1990 [12]. Mineral carbonation is considered as a promising large-scale CO<sub>2</sub> storage application technology [13]. As a raw material for mineral carbonation, steel slag has advantages such as proximity to CO<sub>2</sub> emission sources, significant cost savings in ...

The relationship between the energy storage limit of magnesium slag-based backfill and the curing age period is shown in Fig. 8. From Fig. 8, the energy storage limit of magnesium slag-based backfill tends to increase with the prolongation of curing age. Meanwhile, this relationship follows the law of linear growth of the function, and the ...

Steel slag can be applied as a promising carbon fixing material. This paper mainly explored the characterization and carbonation mechanism of steel slag and its products at relatively low CO<sub>2</sub> pressure. The experimental conditions were pure CO<sub>2</sub> gas, 0.02 MPa CO<sub>2</sub> pressure and 24 h carbonation time. The carbonation reaction degree of samples was ...

Considering the cost of materials and the resourcefulness of solid waste, industrial calcium-containing wastes have been widely noticed as calcium precursors [[24], [25], [26], [27]]. Key high-calcium solid wastes include carbide slag, steel slag, paper mill sludge, and fly ash [24]. Previously, only Yang et al. [25] studied thermal energy storage and light absorption ...

Bisio et al. [11] proposed that heat in liquid and solid slag can be used to produce both steam and high temperature air, and the results showed that energy recovery efficiency of slag energy was about 57%. I&#241;igo and Javier [12] proposed thermal energy storage system based on a dual-media packed bed using steel slag as filler material.

In order to realize the resourceful, large-scale, and high-value utilization of steel slag, which is a bulk industrial solid waste, and to reduce the use of cement-based cementitious materials, this study adopted the coupled excitation effect of sodium carbonate-magnesium oxide-desulfurization gypsum to excite steel

slag-based cementitious materials, and it ...

The conceptual models of AAF and AAFS are proposed to explain the degradation mechanism of low slag contained geopolymers under elevated temperatures. The schematic diagram of heating curve for ...

The reaction mechanism of simultaneous desulfurization and denitrification using steel slag combined with ozone oxidation was proposed and the results showed that the highest NO<sub>x</sub> removal efficiency occurred at an oxidation temperature of 90 °C. In this work, steel slag slurry was used in combination with O<sub>3</sub> oxidation for the simultaneous removal of SO<sub>2</sub> ...

The optimal proportion of alkali-activated steel slag-slag cementitious materials is investigated by considering the combined effects of steel slag content, alkali content, water glass modulus, and water-binder ratio using the Box-Behnken design in response surface methodology. Qualitative and semi-quantitative analyses of X-ray diffraction (XRD) patterns ...

BaTiO<sub>3</sub> ceramics are difficult to withstand high electric fields, so the energy storage density is relatively low, inhabiting their applications for miniaturized and lightweight power electronic devices. To address this issue, we added Sr<sub>0.7</sub>Bi<sub>0.2</sub>TiO<sub>3</sub> (SBT) into BaTiO<sub>3</sub> (BT) to destroy the long-range ferroelectric domains. Ca<sup>2+</sup> was introduced into BT-SBT in the ...

In recent years, magnesium slag has been used as a raw material for solid waste treatment using the carbonization method and has proven to be promising in reducing carbon emissions. In this study, the alkali activation reaction was introduced to promote the carbonization of magnesium slag. The resulting mechanical properties, microstructural ...

Modification of magnesium phosphate cement with steel slag powder and ground blast furnace slag: Mechanism of hydration and electrical conductivity. Author links ... Energy storage is important for the world's transition into a green economy. ... the effects of SSP and GBFS up to a combined 40 wt% of MA on the workability and compressive ...

Stiesdal storage technologies (SST) is developing a commercial RTES system in Lolland, Denmark. 14 Another technology demonstrator was developed by The National Facility for Pumped Heat Energy Storage 36 and SEAS-NVE. 37 Researchers at Newcastle University explored a TES system with a capacity of 600 kWh (rated at 150 kW) and an efficiency of ...

Hence, the present study investigates the cyclic performance characteristics of a thermal energy storage system packed with rock/slag pebbles granules combined with encapsulated phase change ...

Scirpus mariqueter combined with slag-sponges in CW effectively improved the purification effect of damaged saline water, ... the biological mechanism of slag-sponge CW depends on the plant-microorganism

interaction, but the plant-microorganism coupling process is still unknown. ... ATP is the central material for energy release, storage ...

Developing low-cost phase change composites (PCCs) with high performance is of significant importance in thermal energy storage. Herein, four PCCs were prepared with steel slag-fly ash solid wastes and eutectic salt (NaNO<sub>3</sub>-KNO<sub>3</sub>), i.e., pure fly ash based PCC (pFA), pure steel slag based PCC (pSS), steel slag-fly ash based PCC (DSWM), and steel slag-fly ...

A fundamental understanding of the electrochemical reaction process and mechanism of electrodes is very crucial for developing high-performance electrode materials. In this study, we report the sodium ion storage behavior and mechanism of orthorhombic V<sub>2</sub>O<sub>5</sub> single-crystalline nanowires in the voltage window of 1.0-4.0 V (vs. Na/Na<sup>+</sup>). The single ...

The energy storage density for 30 cycles was reduced by 10.26 % for the pellets compared to the powder material, but the average light absorption rate was improved. ... The research found that the abundant iron content in the steel slag, combined with the addition of Mn, significantly enhanced the material light absorption capabilities, leading ...

Renewable energy sources (RES) are the key element of sustainable energy systems. To accommodate the intermittency of wind (and solar) electricity generation, energy storage is critical.

Bioelectrochemical production of CH<sub>4</sub> from CO<sub>2</sub> can be considered as an electricity-storage approach, where electricity is used during periods of low demand (Lehner et al., 2014; Zhen et al., 2017). If the surplus electricity can be stored, then it can be later used during periods of high demand. Power-to-Gas (P2G) technology systems have already been used to ...

In this paper, the ability of thermochemical energy storage materials to release and store thermal energy during cyclic carbonization/calcination reactions is described by the ...

Capacity defines the energy stored in the system and depends on the storage process, the medium and the size of the system;. Power defines how fast the energy stored in the system can be discharged (and charged);. Efficiency is the ratio of the energy provided to the user to the energy needed to charge the storage system. It accounts for the energy loss during the ...

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 ...

To further analyze the energy conversion mechanism of TENGs combined with 3588, ... Fu, S. et al. Efficient energy conversion mechanism and energy storage strategy for triboelectric nanogenerators.

Downloadable (with restrictions)! Utilizing industrial solid waste carbide slag for thermochemical heat storage presents an inexpensive and high-energy-storage-density solution with potential industrial applications. Investigating the performance of carbide slag in thermochemical heat storage cycles can offer insights for efficient resource utilization within the field of heat storage.

Apart from energy storage, ... The mechanism of efficient photothermal conversion of this material is analyzed in Figure 13f, mainly derived from the fact that PEG in the material can uniformly melt/crystallize. The roof panel made by these form-stable PCMs with recyclable skeletons enables both solar energy collection and conversion ...

Kinetic mechanism of coal gasification. As the char/ $\text{CO}_2$  reaction was a typical reaction in the family of gas-solid reactions, various mechanism functions of gas-solid reactions ...

The pursuit of energy storage and conversion systems with higher energy densities continues to be a focal point in contemporary energy research. electrochemical capacitors represent an emerging ...

In the blast furnace slag, around 91 % of the magnesium and 97 % of the calcium are converted to the respective carbonates, and 76 % of the aluminum is recovered as 99.6 wt percent pure  $\text{NH}_4\text{Al}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ . Ju et al. [84] proposed a sustainable method to recover Ti, Al and Mg from titanium-containing blast furnace slag (TBBFS) combined ...

Small amounts of Na, Al and other metal ions in the carbide slag were detected (Table 1); these ions may have been derived from the acetylene raw material (calcium carbide) or mixed impurities in ...

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