

Request PDF | On Aug 1, 2024, Yaxuan Xiong and others published Effect of carbon capture on carbide slag-steel slag shape-stable phase change materials for thermal energy storage | Find, read and ...

Slag is one of the main waste materials of the iron and steel manufacturing. Every year about 20 &#215; 10 6 tons of slag are generated in the U.S. and 43.5 &#215; 10 6 tons in Europe. ...

Boquera et al. [16] investigated a concrete-steel slag thermal storage material using steel slag as aggregate, which has good thermal stability up to 700 &#176;C and a specific heat capacity of 1.85 J/(g&#183;K) at 500 &#176;C. However, this material has a low thermal conductivity of 0.7 W/(m&#183;K) and a small percentage of steel slag.

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 analysis (TGA) and fixed-bed cycling of the material revealed that the material has outstanding cyclic heat storage properties.

The thermal conductivity of the heat storage material is 0.98 W/m?K and can reach 1.27 J/g?K at 720 ?, which has good thermal conductivity and long service life. When the heat storage material rises to 900 ?, the heat storage density can reach 905 J/g, with good heat storage performance and thermal cycle stability.

In this study, the steel slag powder refined by the wet grinding technology is used as the matrix material, MgO as material additive, and the clay is used as the binder to prepare ...

@article{LopezFerber2022DevelopmentOA, title={Development of an electric arc furnace steel slag-based ceramic material for high temperature thermal energy storage applications}, author={Nicolas Lopez Ferber and Kholoud M. Al Naimi and J.-F. Hoffmann and Khalid Al-Ali and Nicolas Calvet}, journal={Journal of Energy Storage}, year={2022}, url ...

For recycling steel slag and carbide slag, improving the efficiency of solar energy utilization, and reducing the thermal energy storage system costs, this work innovatively proposes the mixture of steel slag and carbide slag as skeleton material and NaNO 3 as phase change material to prepare the shape-stable phase change materials and the ...

The authors investigated the potential of utilizing recycled solid waste resources, specifically steel slag, as a sensible heat storage material for thermal energy storage. Moreover, it introduces a novel modification process using sodium carbonate (Na 2 CO 3) to enhance the thermal properties of steel slag.

Aiming to take one step forward in the state of the art of the technology, in this work, a 400 kWh t packed bed system has been tested in the Air Test Loop facility available at ...

DOI: 10.1016/j.jclepro.2023.136289 Corpus ID: 256686161; Exploration of steel slag for thermal energy storage and enhancement by Na<sub>2</sub>CO<sub>3</sub> modification @article{Wang2023ExplorationOS, title={Exploration of steel slag for thermal energy storage and enhancement by Na<sub>2</sub>CO<sub>3</sub> modification}, author={Junlei Wang and Yun Huang}, journal={Journal of Cleaner Production}, ...

The thermal stability and compatibility of steel slag with synthetic oil, solar salt and air in direct contact were analyzed, and a prototype of 400 kWh·T<sup>-1</sup> steel slag-based ...

@article{Liu2023PreparationAC, title={Preparation and characterization of steel slag-based low, medium, and high-temperature composite phase change energy storage materials}, author={Li-Yu Daisy Liu and Hong-xin Zhao and Zhangfu Yuan and Fei Zhao and Desheng Chen and Chunhong Shi}, journal={Journal of Energy Storage}, year={2023}, ...

Slag as an inventory material for heat storage in a concentrated solar tower power plant: Experimental studies on design and performance of the thermal energy storage AIP Conf. Proc. (July 2019) Online ISSN 1551-7616

Request PDF | Synthesis and characterization of form-stable carbonate/steel slag composite materials for thermal energy storage | It is of practical importance to develop form stable composite ...

In the search of new generation of thermal energy storage (TES) alternatives, which could provide a cost-effective, high temperature and efficient performance, single-tank storage alternatives ...

Wang et al. [20] proposed a new method for CO<sub>2</sub> mineralization using blast furnace slag to simultaneously recover TiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>. The ammonia generated during the roasting process of titanium and aluminum is used to capture CO<sub>2</sub> from the flue gas, in the whole process, about 82.1 % of Ca and 84.2 % of Mg in the blast furnace slag underwent a ...

This paper details the development process of ceramics made out of 100% electric arc furnace (EAF) steel slag, to be used as a shaped homogenous thermal energy storage (TES) media in packed-bed ...

Using steel slag to prepare high-temperature (>500 °C) PCMs was an effective way to achieve its high value-added utilization as a potential heat storage medium in a variety of applications, such as solar energy storage, power peak ...

Development of thermal storage material from recycled solid waste resources can further enhance the economic and environmental benefits of thermal energy storage system. Thermal properties of steel slag as sensible heat storage material are examined and further enhanced by Na<sub>2</sub>CO<sub>3</sub> activation. The steel slag

remains stable until 1200 °C in TG ...

In this study, industrial solid waste steel slag was used as supporting material for the first time, and polyethylene glycol (PEG), sodium nitrate ( $\text{NaNO}_3$ ), and sodium sulfate ( $\text{Na}_2\text{SO}_4$ ) were used as low, medium, and high-temperature phase change materials (PCMs). A series of shape-stable composite phase change materials (C-PCMs) were prepared by ...

Aiming to take one step forward in the state of the art of the technology, in this work, a 400 kWh t packed bed system has been tested in the Air Test Loop facility available at CIC Energigune with a double objective: the validation of the steel slag as low-cost and high-performing filler material on one hand, and to investigate the performance ...

In this paper, a cost-effective 400 kWh thermal energy storage prototype for waste heat recovery at high temperature is tested over different charging and discharging conditions. The ...

Development of thermal storage material utilizing recycled solid wastes resources can enhance the economic and environmental benefits of thermal energy storage systems. This report focused on the processing technology and performance of composite phase change thermal storage materials, which were fabricated by direct impregnation method with ...

These experimental results show that the three kinds of PEG/steel slag,  $\text{NaNO}_3$  /steel slag, and  $\text{Na}_2\text{SO}_4$  /steel slag C-PCMs have good thermal storage performance and ...

Slag is one of the main waste materials of the iron and steel manufacturing. Every year about 20 · 10<sup>6</sup> tons of slag are generated in the U.S. and 43.5 · 10<sup>6</sup> tons in Europe. The valorization of this by-product as heat storage material in thermal energy storage (TES) systems has numerous advantages which include the possibility to extend the working temperature ...

The revalorization of this by-product as heat storage material in thermal energy storage systems would have numerous advantages which include: the possibility to extend the working temperature range up to 1000 °C, the reduction of the ...

Heat storage temperature, heat storage density, heat storage stability and the cost of heat storage are the breakthroughs for further development of heat storage materials. In this study, a new type of sensible heat storage material was prepared by using low-cost steel slag as the main component, and at the same time, an effective way of recycling steel slag was provided. The ...

Slag is the steel industry's biggest waste byproduct. It could find a use: to cut the carbon emissions from steel production. Starting this year, thermal energy researchers in Spain's Basque Country will test the use of slag as thermal energy storage within the steelmaking process, to cut the use of fossil fuel for heat for the world's

largest steel producer, Arcelor Mittal.

No new major phase was detected after the heat-treatment, the sintering process or the cycling, implying the ceramic is reasonably mineralogically stable, safe for variations of the existing phases" relative proportions. ... Experimental validation of steel slag as thermal energy storage material in a 400 kWh prototype. AIP Conf. Proc., 2126 ...

Request PDF | On Apr 1, 2023, Junlei Wang and others published Exploration of steel slag for thermal energy storage and enhancement by Na<sub>2</sub>CO<sub>3</sub> modification | Find, read and cite all the research ...

This alternative has shown large potential in the thermal energy storage frame as demonstrated by the increasing interests shown by the international scientific and technological community [20], [21], [22]. The main goal of this work is to demonstrate the suitability of steel slag as a heat storage material in a packed bed arrangement.

DOI: 10.1016/j.est.2022.104708 Corpus ID: 248656348; Synthesis and characterization of form-stable carbonate/steel slag composite materials for thermal energy storage @article{Wang2022SynthesisAC, title={Synthesis and characterization of form-stable carbonate/steel slag composite materials for thermal energy storage}, author={Junlei Wang ...

Steel slag is a promising heat storage material which remains stable until 1200 °C and have good thermal cyclic stability. Thermal performance of steel slag as sensible heat storage material is further enhanced by Na<sub>2</sub>CO<sub>3</sub> activation. The obtained modified material has the heat storage capacity increased 25.3% and heat conductivity increased more than 32.7%.

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