

Sludge energy storage materials

Can sewage sludge be used as energy storage materials?

However, the investigation concerning sewage sludge derived HA as the precursor is almost blank, and most HA-based energy storage materials are prepared by using the commercial HA, commercial potassium humate, biomass and low grade coal (Huang et al., 2018, Yin et al., 2014, Das et al., 2017, Qiao et al., 2014).

Why is sludge based ha better than other precursors?

Differing from other precursors needing high addition of activator to obtain the high-quality supercapacitor electrodes, the sludge-derived HA-based materials possess higher specific surface area, more hierarchical micro-mesoporous structure, and thus exhibit excellent performance, when HA is thermal treated by KOH at a low mass ratio of 1:1.

Can sludge derived ha be used as a supercapacitor electrode?

The results indicate that the sludge-derived HA-based materials can be used as electrode materials for supercapacitors. Some of the other materials, though, are better than those in the present study, indicating that there is room for improvement of sludge-derived HA as a precursor, to make it more suitable as a supercapacitor electrode. Table 4.

How can sewage sludge be recovered in a high-value-added way?

This study aims to recover sewage sludge in a high-value-added way by extracting HA as a precursor for the preparation of electrode materials, which is conducive to the resourceful utilization of sludge-derived HA and can effectively solve the problem of limited gas production from AD of sludge, thus achieving a maximum double benefit.

Are hnepcms effective thermal energy storage materials?

Thus, HNePCMs are demonstrated to be more efficient materials and are emerging as potential materials to augment the performance of TES applications. The authors declare no conflict of interest. The disparity between the supply and demand for thermal energy has encouraged scientists to develop effective thermal energy storage (TES) technologies.

How is activated sludge used in domestic wastewater treatment?

The conventional activated sludge (CAS) process has been employed for domestic wastewater treatment for more than 100 years, where organic matters are mainly converted to biomass and carbon dioxide. In practice, the CAS process has been extended and modified to handle soluble nutrients (e.g. nitrogen and phosphorus) present in domestic wastewater.

Phase change materials (PCMs) are ideal carriers for clean energy conversion and storage due to their high thermal energy storage capacity and low cost. During the phase transition process, PCMs are able to store thermal energy in the form of latent heat, which is more efficient and steadier compared to other types of heat

storage media (e.g ...

Sewage sludge and red mud, as common industrial waste, have become a research hotspot in the field of achieving carbon peaking and carbon neutrality, reducing carbon emissions, and solving environmental problems. However, their treatment and disposal have always been a difficult problem in the environmental field. Utilizing these two materials for ...

This groundbreaking work proposed municipal sludge-derived phase-change composites utilizing potassium nitrate as phase change material to produce cost-effective, low-carbon thermal ...

Coffee is one of the largest agricultural products; however, the majority of the produced coffee is discarded as waste sludge by beverage manufacturers. Herein, we report the use of graphitic porous carbon materials that have been derived from waste coffee sludge for developing an energy storage electrode based on a hydrothermal recycling procedure. Waste ...

The demand for energy has increased tremendously around the whole world due to rapid urbanization and booming industrialization. Energy is the major key to achieving an improved social life, but energy production and utilization processes are the main contributors to environmental pollution and greenhouse gas emissions. Mitigation of the energy crisis and ...

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Herein, we report the use of graphitic porous carbon materials that have been derived from waste coffee sludge for developing an energy storage electrode based on a hydrothermal recycling procedure. Waste coffee sludge is used as a carbonaceous precursor for energy storage due to its greater abundance, lower cost, and easier availability as ...

Storage and conversion of renewable, dispersive and non-perennial energy from the sun, wind, geothermal sources, water, or biomass could be a promising option to relieve this crisis. Carbon materials could be the most versatile platform materials applied in the field of modern energy storage and conversion.

Previously reported that the thermal conditioning of sludge to produce high-value materials such as biochar, bio-oil, and biogas is an environmentally sustainable approach (Bashir et al., 2022; Ghodke et al., 2021). ... Obtaining high-value nitrogen-containing carbon nanosheets with ultrahigh surface area from waste sludge for energy storage ...

Thus, the conversion of the HA-rich content in sludge into electrode materials reduces the HA content (indirectly enhancing the methane production efficiency) and generates energy-storage materials. Yin et al. (2014) first utilized HA as a raw material to synthesize activated carbon (AC) through a high-temperature activation process with KOH.

The pressing concerns surrounding environmental pollution and the energy crisis have made it imperative to create clean, high-performance, and low-cost functional materials toward effectively realizing environmental protection and energy generation, conversion, and storage [1, 2]. Carbon materials are integral to energy conversion and storage processes, ...

Supercapacitors are considered one of the most promising energy storage and supply technologies due to their extended life cycle, ultrahigh power density, and fast charge/discharge process (within seconds). ... (2022) A comprehensive analysis on optimization of Sewage sludge ash as a binding material for a sustainable construction practice: a ...

Pulp mill sludge is a challenging by-product in wastewater treatment plants (WWTP), due to high moisture content, and poor dewatering characteristics. Solar drying was identified as an appropriate pre-treatment to reduce sludge moisture and enhance its energy efficiency for combustion purposes. Brazil is the world's second-largest pulp producer, and its ...

Phase change materials (PCM) have the characteristics of high thermal storage density and approximate constant temperature during the phase change process [1, 2]. Therefore, it is of high application potential in fields such as thermal management systems, solar energy conversion and storage, and constant temperature transportation [[3], [4], [5]]. Now, PCMs ...

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For rechargeable batteries, metal ions are reversibly inserted/detached from the electrode material while enabling the conversion of energy during the redox reaction [3]. Lithium-ion batteries (Li-ion, LIBs) are the most commercially successful secondary batteries, but their highest weight energy density is only 300 Wh kg⁻¹, which is far from meeting the ...

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