

Ferroelectric polymers with robust electrical polarization have been extensively investigated for capacitive energy storage. However, their inherent ferroelectric hysteresis loss ...

An ultrahigh discharge energy density of 38.8 J cm^{-3} along with a high discharge efficiency of $>80\%$ is achieved at the electric field of 800 kV mm^{-1} in the gradient polymer films, which is the highest energy density reported thus far in polymer-based dielectrics including their nanocomposites and the highest energy efficiency achieved ...

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Here, guided by phase-field simulations, a capacitor is reported to operate at a record high operating temperature of $400 \text{ }^\circ\text{C}$ with an energy storage density of $55.4 \text{ joules per cubic centimeter}$, energy efficiency of over 82% , and superior thermal stability and fatigue properties.

Graphene, versatile building blocks for functional composite materials, shows multiple fascinating properties and draws great interest, especially in the field of electrochemical energy storage. However, several common drawbacks still persist, including (i) it tends to aggregate and restack to loss the surface area, (ii) it is difficult to composite with other materials due to the limited ...

Magnetic-assisted alignment of nanofibers in a polymer nanocomposite for high-temperature capacitive energy storage applications. Materials Horizons ... Shuxuan Li; Xin Zhen; Zhonghui Shen; Baowen Li; Xin Zhang; Ce-Wen Nan Show more detail. Source: [check_circle](#). Crossref ... The text of this website is published under a CC0 license.

1 INTRODUCTION. The change from fossil fuels to renewable energy supply requires efficient and reliable energy storage systems. 1 Rechargeable Li-ion batteries (LIBs) are one of the greatest inventions that have been widely used in portable electronics and electric vehicles. 2, 3 Safety becomes a major concern as high-energy devices pose the risk of failure ...

The Daily Mail of Zambia reported that China's Zhonghui Mining Group has signed a deal with the Zambian government to invest USD 3.6 billion in various mining projects on the Copper Belt and North Western provinces, The state owned daily reports that Zhonghui Mining will draw up an implementation framework for the various projects, expected to ...

Ferroelectric polymers with robust electrical polarization have been extensively investigated for capacitive

energy storage. However, their inherent ferroelectric hysteresis loss limits the discharged energy density and compromises energy efficiency.

Sodium ion batteries (SIBs) are a low-cost and promising alternative to lithium ion batteries, however, due to the large sodium ion size (Na^+ vs Li^+ : 1.02 Å vs 0.76 Å), high ion diffusion barrier and huge volume variation of electrode materials, it remains a challenge to achieve satisfactory Na^+ storage performance. To address these issues, herein, we deliberately designed a ...

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The high-entropy films show greater stability of the polarization behaviours (Supplementary Fig. 8) and energy storage properties (Fig. 4d and Supplementary Fig. 9), compared to the $x = 0.0$...

Polymer dielectric materials with high energy storage density are vital component in advanced electronic devices. However, the increase of conduction loss at relatively high electric field will lead to film failure and hinder the exploration of high energy density in the dielectric polymer. Herein, a general strategy is proposed to effectively enhance the breakdown strength ...

At present, the clean energy that can replace fossil fuels includes wind energy [4], tidal energy [5], solar energy [6], hydrogen energy [7] and so on. Among them, hydrogen energy stands out for its rich storage capacity (in the atmosphere of the sun, according to the atomic percentage, hydrogen atom accounts for 81.75%) [8], high energy ...

Here, taking dielectric capacitors and lithium-ion batteries as two representative examples, we review substantial advances of machine learning in the research and development of energy storage materials. First, a thorough discussion of the machine learning framework in materials science is presented.

With the ultrahigh power density and fast charge-discharge capability, a dielectric capacitor is an important way to meet the fast increase in the demand for an energy storage system such as pulsed power systems (PPS). The BaTiO_3 -based capacitor is considered as one of the candidates for PPS due to its high permittivity. However, with the continuous ...

The shortage of lithium resources has hindered the future development of lithium ion batteries (LIBs), especially in large-scale energy storage [1], [2], [3]. With the naturally abundant sodium resources on earth, sodium ion batteries (SIBs) have attracted worldwide concern for one of the most potential alternatives to LIBs [4], [5].

Zhong-Hui Sun's 12 research works with 504 citations and 617 reads, including: Nano self-assembly of fluorophosphate cathode induced by surface energy evolution towards high-rate and stable sodium ...

Full-text available. Dec 2021; Jiayu Chen. Bao-Wen Li ... Zhonghui Shen; Ce-Wen Nan; Polyvinylidene fluoride (PVDF) film with high energy storage density has exhibited great potential for ...

Electric energy storage technologies play an essential role in advanced electronics and electrical power systems 1,2,3,4,5. Many advanced electrical devices call for energy storage with ...

The rapid development of clean energy provides effective solutions for some major global problems such as resource shortage and environmental pollution, and full utilization of clean energy necessitates overcoming the randomness and intermittence by the integration of advanced energy storage technologies. 1-4 For this end, dielectric energy-storage capacitors ...

As expected, the assembled SICs with the Fe₇Se₈@NC anode and active carbon cathode deliver prominent energy/power densities and an ultra-long cycle life over 5000 cycles, shedding new light on the ...

After impregnation with NaCl-NaF eutectics, broadband sunlight capture with average solar absorptance of 95.25%, rapid thermal transport with thermal conductivity of 20.7 W/mK, and compact latent heat storage with energy storage density of up to 424 kJ/kg are demonstrated simultaneously.

The battery energy storage system (BESS) is an attractive solution to level the grid load and has been introduced independently into many communities, although with high costs.

An ultrahigh energy density of 50 J cm⁻³ is achieved for the nominal Pb_{0.925}La_{0.05}ZrO₃ (PLZ5) films at low electric fields of 1 MV cm⁻¹, exceeding the current dielectric energy ...

Ming Liu, Rui Lu, Zhonghui Shen, Chunrui Ma, Tingzhi Duan, Lu Lu, and 6 more. ... guided by phase-field simulations, we synthesized capacitors with an energy storage density of 55.4 joules per cubic centimeter, energy efficiency of over 82%, and superior thermal stability and fatigue properties at record high operating temperature of 400°C ...

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