

The PU infiltrated CNTS (PU@CNTS) composite features flexible, anisotropic, dual form-stable and electro/photo driven with high-energy harvesting and storage efficiency. In our devised PU@CNTS composite structure, the dual form-stability arises from the primary confinement of PEG segment within PU skeleton and then PU infiltration into the ...

Flexible energy storage devices have received much attention owing to their promising applications in rising wearable electronics. By virtue of their high designability, light weight, low cost, high stability, and mechanical flexibility, polymer materials have been widely used for realizing high electrochemical performance and excellent flexibility of energy storage ...

exploitation and use of energy, problems such as energy depletion and environmental pollution have become increasingly serious. There is an urgent need for new, abundant, and clean energy-storage devices to address these issues [1]. Supercapacitors have received widespread attention as a new type of electrochemical energy-storage device. In recent

Attempts to develop flexible energy storage devices have led to the use of techniques such as the deposition of organic and inorganic films on flexible substrates (e.g., mica, polyimide, and polyethylene terephthalate), and the mechanical peeling and/or transfer of films from rigid/water-soluble substrates to flexible substrates has been widely ...

To persistently power wearable devices, lightweight and flexible energy storage units with high energy density and electrochemical stability are in urgent need 4,5,6,7. Rigid-typed lithium-ion ...

With the rapid progress of electronic technology, more and more portable electronic devices are developing toward the flexible wearable direction [1,2,3,4,5,6]. At present, achieving ultra-long standby time and the service life is one of the important research fields of flexible devices, which puts forward higher requirements for energy storage components [7,8,9].

Energy storage is key to secure constant renewable energy supply to power systems - even when the sun does not shine, and the wind does not blow. Energy storage provides a solution to achieve flexibility, enhance grid reliability and power quality, and accommodate the scale-up of renewable energy. But most of the energy storage systems ...

Consequently, there is an urgent demand for flexible energy storage devices (FESDs) to cater to the energy storage needs of various forms of flexible products. FESDs can be classified into ...

Constructing a new power system with renewable energy as the main body is an important way to achieve the

goal of carbon emission reduction. However, uncertainty and intermittency of wind and solar power generation lead to a dramatic increase in the demand for flexible adjustment resources, mainly hybrid energy storage.

This work provides a new approach for developing functional composite films through a combination of elastic polymers and multifunctional phase-change microcapsules for infrared thermal camouflage and photothermal energy storage. ... A series of flexible PU/MePCM composite films with different loadings of PANi@TiO₂ @C 22 MePCM were prepared to ...

The integration of ultraflexible energy harvesters and energy storage devices to form flexible power systems remains a significant challenge. Here, the authors report a system consisting of ...

To achieve complete and independent wearable devices, it is vital to develop flexible energy storage devices. New-generation flexible electronic devices require flexible and ...

9.1.2 Miniaturization of Electrochemical Energy Storage Devices for Flexible/Wearable Electronics. Miniaturized energy storage devices, such as micro-supercapacitors and microbatteries, are needed to power small-scale devices in flexible/wearable electronics, such as sensors and microelectromechanical systems (MEMS).

Supercapacitors and batteries are ideal energy storage devices that can easily meet the energy demands of flexible and wearable electronics, and research in the past decade has already achieved great advances in combining the high-energy density of batteries with the high-power density of supercapacitors by developing new energy materials.

However, the production of flexible and efficient smart energy storage fiber is still challenging. Here, flexible electro-/photo-driven energy storage polymer fiber with outstanding hydrophobicity and self-cleaning property is fabricated.

Polyurethane (PU) based phase change materials (PCMs) undergo the solid-solid phase transition and offer state-of-the-art thermal energy storage (TES). Nevertheless, the exploration of these PCMs in ... Expand

DOI: 10.1016/J.ENSM.2018.10.014 Corpus ID: 139216396; Polyurethane-based flexible and conductive phase change composites for energy conversion and storage @article{Aftab2019PolyurethanebasedFA, title={Polyurethane-based flexible and conductive phase change composites for energy conversion and storage}, author={Waseem Aftab and ...

Flexible energy storage devices based on an aqueous electrolyte, alternative battery chemistry, is thought to be a promising power source for such flexible electronics. ... Further, beyond flexibility, this review summaries advanced energy storage devices with new functionality such as transparency and stretchability for future wearable ...

In recent years, the growing demand for increasingly advanced wearable electronic gadgets has been commonly observed. Modern society is constantly expecting a noticeable development in terms of smart functions, long-term stability, and long-time outdoor operation of portable devices. Excellent flexibility, lightweight nature, and environmental ...

Recent advances in wearable self-powered energy systems based on flexible energy storage devices integrated with flexible solar cells. ... including different kinds of batteries and SCs have already made great progress with the help of the development of new energy materials and device structures. ... rGO@PU: 25-30 kPa -1: 109: Pulse ...

Polyurethane phase change materials (PUPCMs) have been extensively applied in smart textiles and wearable electronic devices because of their excellent energy storage capacity. To realize the flexibility of PUPCMs for certain deformation and compact contact with objects, suitable support structures have been chosen to prepare polyurethane phase change ...

Consequently, there is an urgent demand for flexible energy storage devices (FESDs) to cater to the energy storage needs of various forms of flexible products. FESDs can be classified into three categories based on spatial dimension, all of which share the features of excellent electrochemical performance, reliable safety, and superb flexibility.

Schematics of flexible property measurements: (a) Schematics of bending at different angles and the three key parameters (L , th , and R) that are generally applied to assess the bending state of flexible energy storage devices, (b) The influence of the specimen length impact on Zn-MnO₂ batteries at a fixed bending angle of 90°; and a bending ...

The PU encapsulated nanoparaffin wax exhibited high energy storage efficiency (80.2%), melting/crystallization phase change enthalpies (153.9/142.3 J/g), and energy storage capacity (97.5%). The eradication of leakage problems and enhancing the TES density of PCMs can also be achieved via the application of PU fibers as supporting materials.

Allowed the solution to dry at room temperature for seven days and then at 65°C for 12 h to get PTPU films., The flexible PU films with photothermal conversion and energy storage performances were successfully synthesized and the functional films presented both excellent energy storage and mechanical property when the molecular weight of PEG ...

To meet the rapid development of flexible, portable, and wearable electronic devices, extensive efforts have been devoted to develop matchable energy storage and conversion systems as power sources, such as flexible lithium-ion batteries (LIBs), supercapacitors (SCs), solar cells, fuel cells, etc. Particularly, during recent years, exciting works have been done to explore more ...

Flexible self-charging power sources harvest energy from the ambient environment and simultaneously charge energy-storage devices. This Review discusses different kinds of available energy devices ...

novel, all - solid - state, flexible " energy fiber " that integrated the functions of photovoltaic conversion and energy storage has been made based on titania nanotube - modified Ti wire

The lithium ion battery was cycled for 100 cycles at C/5 rate between 3.0 and 4.2 V. Figure 3a shows the 1 st, 10 th and 100 th charge-discharge curves of the battery, which lay on top of each ...

Phase change materials (PCMs) have been extensively explored for latent heat thermal energy storage in advanced energy-efficient systems. Flexible PCMs are an emerging class of materials that can withstand certain deformation and are capable of making compact contact with objects, thus offering substantial potential in a wide range of smart applications.

Energy storage solutions will take on a dominant role in fulfilling future needs for supplying renewable energy 24/7. It's already taking shape today - and in the coming years it will become a more and more indispensable and flexible part of our new energy world.

storage devices. New-generation flexible electronic devices require flexible and reliable power sources with high energy density, long cycle life, excellent ... FIGURE 1 The evolution of flexible energy storage devices in previous reports.²¹⁻⁴⁷ Images reproduced with permission. 2of28| ZHANG ET AL. Based on recent developments, there are ...

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