

Fiber-shaped energy harvesting and storage devices

To this end, fiber-shaped energy devices present unique and unusual advantages, for example, being woven into various electronic textiles by traditional textile industry, flexibility for bending devices, and potential for self-powered systems. ... Fiber-Shaped Integrated Device. In: Fiber-Shaped Energy Harvesting and Storage Devices ...

In addition, we introduce remarkable applications of fiber-shaped devices for energy harvesting/storage, sensing, and light-emitting devices. Electronic fibers offer high potential for use in next-generation electronics, such as electronic textiles and smart integrated textile systems, which require excellent deformability and high operational ...

Fiber-Shaped Energy-Storage Devices: Recent Advances in Fiber-Shaped Supercapacitors and Lithium-Ion Batteries (Adv. Mater. 5/2020) Yang Zhou, Yang Zhou. Faculty of Engineering, University of New South Wales, Sydney, NSW, 2052 Australia. Search for more papers by this author.

The fiber-shaped perovskite solar cells with the unique shape and the characteristic of all-solid-state have unprecedented potential to produce energy fibers, even energy textiles. The development of novel coating process to fabricate uniform layers, similar as spin-coating process counterpart in planar solar cell, is key to boost the PECs ...

In this chapter, the necessity for the fiber-shaped device is discussed in modern electronics. The main efforts are first paid to describe the difficulty in the development of conventional planar energy harvesting and storage devices including solar cells, electrochemical capacitors, and lithium ion batteries.

Wearable electronics fabricated on lightweight and flexible substrate are widely believed to have great potential for portable devices (1-3). Several promising applications, for example e-skin, smartwatches, and bracelets, have been successfully achieved for the replacement of conventional electronic gadgets (4-6). Lightweight and wearable power supply ...

Power systems and electronic devices that are bulky and rigid are not practical for use in wearable applications that require flexibility and breathability. To address this, a range of 1D energy harvesting and storage devices have been fabricated that show promise for such applications compared with their 2D and 3D counterparts. These 1D devices are based on ...

Traditional solar cells based on planar sandwiched structures are restricted by heavy electrode materials, cost-consuming technologies and application flexibility. To overcome these issues, fiber-shaped dye-sensitized (FDSC) and perovskite solar cells (FPSC) for portable/wearable energy harvesting were developed, and conversion efficiencies of 8.07% ...

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Flexible fiber-shaped energy storage devices: principles, progress, applications and challenges. Jing Ren 1, ... Zhang J, Sun X M and Peng H S 2017 Energy harvesting and storage in 1D devices Nat. Rev. Mater. 2 17023. Crossref Google Scholar [3] Yetisen A K, Qu H, Manbachi A, Butt H, Dokmeci M R, Hinstroza J P, Skorobogatiy M, ...

Herein, in a timely response to this exciting development, we look into the recent advances in quasi-solid-state fiber-shaped aqueous ESDs, by providing a comprehensive and critical overview of new design principles, key progress in ...

For better wearing flexibility and breathability, a series of fiber-shaped energy harvesting devices have been manufactured to adapt to deformations caused by twisting or stretching, which can serve as very promising on-body power sources.

Super-capacitors, lithium ion batteries, aluminium air batteries, lithium air batteries, lithium sulfur batteries, and zinc-air batteries can be utilized for flexible electronic device applications as their energy storage devices. All of them possess desired features of all-dimension-deformability and weaveability. Also they can be part of bigger picture by integrating with flexible, wearable ...

Inspired by the wearable energy devices, fiber-shaped supercapacitors have witnessed an upsurge in interest. As we discussed previously, various fiber-shaped supercapacitors are developed with the diversification of fiber electrodes. ... Fiber-Shaped Supercapacitor. In: Fiber-Shaped Energy Harvesting and Storage Devices. Nanostructure ...

Fiber-Shaped Perovskite Solar Cell.- Fiber-Shaped Supercapacitor.- Fiber-Shaped Lithium-Ion Battery.- Fiber-Shaped Integrated Device.- Energy Textiles.- Summary and Outlook. ... Search. Sign In Create Free Account. DOI: 10.1007/978-3-662-45744-3; Corpus ID: 135833253; Fiber-Shaped Energy Harvesting and Storage Devices @inproceedings ...

Here, a multifunctional coaxial energy fiber has been developed toward energy harvesting, energy storage, and energy utilization. The energy fiber is composed of an all fiber ...

The currently on-going surge in portable and wearable electronics and devices has caused an ever-increasing rise in the requirement for highly compact and yet flexible energy storage devices (ESDs), especially for those quasi-solid-state fiber-shaped ESDs which possess a 1D unique architecture with a tiny volume, remarkable flexibility, and miniaturization potential.

Another relatively well-established energy harvesting technique is based on piezoelectrics, materials that generate electric charge when squeezed or pressed. In 1998, MIT researchers were some of the first to experiment with embedding them in shoes -- a technique that garnered the interest of the US military.

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New materials and innovative designs are highlighted for these fiber-shaped energy harvesting devices. Compared with the dye-sensitized solar cells (DSCs) that often require liquid electrolytes, PSCs are all-solid-state devices. ... Fiber-Shaped Polymer Solar Cell. In: Fiber-Shaped Energy Harvesting and Storage Devices. Nanostructure Science ...

Continuously charging an energy storage system (ESS) without the consumption of fossil fuels has always been an attractive proposition towards a sustainable low-carbon society [1, 2]. This is especially desirable with the tremendous adoption of portable devices such as wearable electronics in recent years, where energy consumption has been rapidly on the rise over the ...

Aligned carbon nanotube (CNT) fibers have been considered as one of the ideal candidate electrodes for fiber-shaped energy harvesting and storage devices, due to their merits of flexibility, lightweight, desirable mechanical property, outstanding electrical conductivity as well as high specific surface area. Herein 2021 Reviews in RSC Advances

Fibrous energy-autonomy electronics are highly desired for wearable soft electronics, human-machine interfaces, and the Internet of Things. How to effectively integrate various functional energy fibers into them and realize versatile applications is an urgent need to be fulfilled. Here, a multifunctional coaxial energy fiber has been developed toward energy ...

The boom in portable and wearable electronics has increased the high demand for suitable energy storage devices. To satisfy these requirements, new strategies for fiber-shaped supercapacitors (SCs) ...

Accompanied with the rapid growth of wearable devices, matching energy harvesting and storage systems are urgently needed. 5-8 Among a variety of power systems, the fiber-shaped energy devices have been regarded as a promising strategy due to their more outstanding flexibility and knittability than planar-shaped ones, and because they can be ...

Energy-harvesting devices in fiber shape can be woven into yarns or fabrics to build large-scale wearable electronic systems, ... (FLIBs), as a kind of fiber-shaped energy storage devices, were reported almost 10 years ago and soon attracted the interest of researchers (Kwon et al., 2012; Ren et al., 2013).

Supercapacitors use materials like carbon, conductive polymers, metal oxide nanoparticles, and their composites for energy storage. 4 Fiber-Shaped Energy Harvesting Devices. It is evident from the previous section that new forms of energy harvesting and storage devices are necessary to power the ever-increasing demand for wearable applications.

Here, the key advancements related to fiber-shaped energy storage devices are reviewed, including the synthesis of materials, the design of structures, and the optimization of properties for the most explored energy storage devices, i.e., supercapacitors, aprotic lithium-based batteries, as well as novel aqueous battery systems.

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For better wearing flexibility and breathability, a series of fiber-shaped energy harvesting devices have been manufactured to adapt to deformations caused by twisting or stretching, which can serve as very promising on-body power sources. ... Textile-Based Energy Harvesting and Storage Devices for Wearable Electronics. Related; Information ...

This paper will provide a detailed review on the importance of substrates in electronic devices, intrinsic property requirements, fabrication classification and applications in ...

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 ...

In the light of the mentioned three fiber-shaped energy harvesting devices, ... Besides, as a wearable energy storage device, the fiber-shaped batteries should be washable and stable under complex stress. For high power density energy storage fibers, the self-discharge of fiber-based supercapacitors need to be solved. ...

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