SolarTech Power Solutions

Electrochemical energy storage in graphene

Overview

Here we discuss the most recent applications of graphene — both as an active material and as an inactive component — from lithium-ion batteries and electrochemical capacitors to emerg- ing technologies such as metal–air and magnesium-ion batteries.Can graphene-based materials be used as electrodes for electrochemical energy storage?

This paper provides an overview of recent research progress in graphene-based materials as electrodes for electrochemical energy storage. Beginning with a brief description of the important properties of single-layer graphene, methods for the preparation of graphene and its derivatives (graphene oxide and reduced graphene oxide) are summarized.

Can graphene be used for energy storage?

Additionally, it describes the functionalization of graphene to enhance its characteristics for electrochemical energy storage applications. The second chapter focuses on the application of graphene in supercapacitors, energy storage devices that require high power density.

What is graphene oxide?

Graphene oxide (GO), a single sheet of graphite oxide, has shown its potential applications in electrochemical energy storage and conversion devices as a result of its remarkable properties, such as large surface area, appropriate mechanical stability, and tunability of electrical as well as optical properties.

Can graphene improve the performance of lithium–sulfur and lithium–oxygen batteries?

The use of graphene for improving the performance of lithium–sulfur and lithium–oxygen batteries is also presented. Future research trend in the development of high-power-density and high-energy-density electrochemical energy storage devices is analysed.

What are the practical challenges in the use of graphene materials?

Graphene materials face several practical challenges when used as active components in electrochemical energy storage devices. One major challenge is their much lower capacitance compared to theoretical values: 550 F g−1 for supercapacitors and 744 mA h g−1 for lithium ion batteries.

What are the applications of graphene?

Here we discuss the most recent applications of graphene — both as an active material and as an inactive component — from lithium-ion batteries and electrochemical capacitors to emerging technologies such as metal–air and magnesium-ion batteries.

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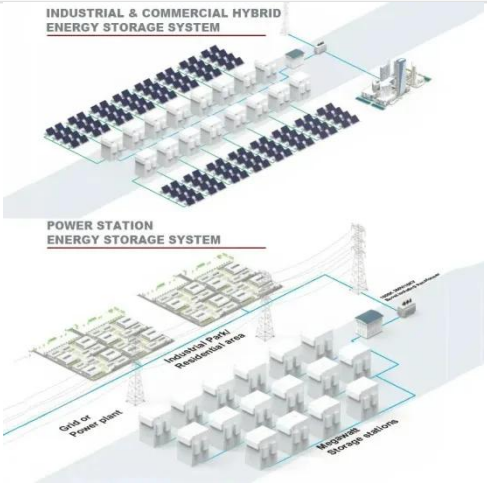

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