

Structural design of energy storage device





Overview

This review mainly focuses on the mechanical deformation characterization, analysis, and structural design strategies used in recent flexible lithium-ion batteries (LIBs) and supercapacitors (SCs). How structural energy devices can improve energy conversion and storage performance?

The structural design of energy devices can achieve satisfactory energy conversion and storage performance. To achieve lightweight design, improve mechanical support, enhance electrochemical performance, and adapt to the special shape of the device, the structural energy devices develop very quickly.

How to design a functional energy storage device?

Therefore, advanced simulation methods considering multi-physical properties (mechanical, thermal, and electrical) need to be developed to guide the design of functional energy devices. The combination of multi-physics numerical modelling and data-driven design offers a powerful way for the next generation energy storage device design .

What is the design principle for energy storage?

For the energy storage technique, the design principle needs to consider the integration of material property, microstructure, and performance across multiple temporal and spatial scales . Some design strategies were discussed in Section 2. The conventional device design is usually very time-consuming and through trial-and-error.

What are structural energy devices?

Recent developments of structural energy devices are reviewed, including fuel cells, lithium-ion batteries, lithium metal batteries and supercapacitors. The structural design of fuel cell components are summarized, and the skin-core sandwich structure of structural fuel cell is discussed.



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Recent development and progress of structural energy devices

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