Prospects of organic material batteries

Can organic materials serve as sustainable electrodes in lithium batteries?
Organic materials can serve as sustainable electrodes in lithium batteries. This Review describes the desirable characteristics of organic electrodes and the corresponding batteries and how we should evaluate them in terms of performance,cost and sustainability.

Are organic electrode materials suitable for practical Li batteries?
This Review systematically analyses the prospects of organic electrode materials for practical Li batteries by discussing the intrinsic properties of organic electrode materials, such as energy density, power density, cycle life, gravimetric density and electronic conductivity.

Can inorganic electrode materials promote battery sustainability?
Furthermore,the transition from inorganic to organic electrode materials can promote battery sustainability. Organic electrode materials with tunable structures are promising lithium-battery electrodes,while electronic conductivity and density need to be fully optimized .

Do organic batteries have lower volumetric densities than inorganic batteries?
However,batteries with organic electrode materials gen-erally exhibit lower volumetric densitiesthan those with inorganic materials,as one would expect,given the lower density of organic materials.

Can organic materials be used to develop battery systems?
Nevertheless,due to the enormous success of graphite-based and inorganic electrode materials in both research and commercialization,organic materials have received very little attentionin the past several decades for the development of battery systems.

Can organic active materials be commercialized in aqueous batteries?
Although organic active materials (OAMs) are widely studied in organic and aqueous batteries, there are still some challenges to overcome before large-scale commercialization.

Potassium-ion batteries (PIBs) have garnered significant interest due to their abundant resources, wide distribution and low price, emerging as an ideal alternative to lithium-ion batteries for energy storage systems. As one of the key components, anode materials act as a crucial role in the specific capacity, energy density, power density and service life of PIBs, so it ...

As potential alternatives to conventional inorganic materials, organic compounds are attractive for use as the cathodes of aqueous zinc-ion batteries (ZIBs), due to their high theoretical capacities, structural tunability, ...

Layered materials with two-dimensional ion diffusion channels and fast kinetics are attractive as cathode materials for secondary batteries. However, one main challenge in potassium-ion ...

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COFs are currently among the most promising materials for organic batteries in terms of structure and performance characteristics [7], [8], ... Prospects of organic electrode materials for practical lithium batteries. Nat. Rev. Chem., 4 (2020), pp. 127-142, 10.1038/s41570-020-0160-9. View in Scopus Google Scholar [2]

Organic material electrodes are regarded as promising candidates for next-generation rechargeable batteries due to their environmentally friendliness, low price, structure diversity, and flexible molecular structure design. However, limited reversible capacity, high solubility in the liquid organic electrolyte, low intrinsic ionic/electronic conductivity, and low ...

Rechargeable organic batteries with high active material mass loading and limited electrolyte usage are likely an important step toward practical batteries. ... The biodegradable batteries with ...

This comprehensive review classifies the various bipolar organic active materials that have been studied in symmetric redox flow batteries, emphasizing current challenegs and ...

Up to now, significant achievements have been made by optimizing each component of S-LSeBs, including the exploration and designation of various solid electrolytes, the optimization of anode and the construction of composite cathode, as illustrated in the Fig. 1.For better understanding the working mechanism and the latest progresses in S-LSeBs, a ...

Redox flow batteries (RFBs) are regarded a promising technology for large-scale electricity energy storage to realize efficient utilization of intermittent renewable energy. Redox -active materials are the most ...

Most research into organic electrodes has focused on the material level instead of evaluating performance in practical batteries. This Review addresses this by first providing an overview of ...

However, most organic compounds are insulators (s < 10 -9 S cm -1) and their low intrinsic electronic conductivity limits the performance of batteries based solely on organic active materials ...

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