High-performance organic lithium battery technology

Can organic polymers be used in lithium-ion batteries?
Organic polymers are considered promising candidatesfor next-generation green electrode materials in lithium-ion batteries (LIBs). However,achieving long cycling stability and capacity retention at high current densities remains a significant challenge due to weak structural stability and low conductivity.

Are lithium-ion batteries a layered organic cathode?
A metal-free layered organic cathode materialfor lithium-ion batteries intercalates Li +and stores more energy with a shorter charging time than inorganic incumbents. Lithium-ion batteries (LIBs) are dominant energy storage solutions for electrifying the transportation sector and are becoming increasingly important for decarbonizing the grid.

Are organic materials a good anode material for lithium ion batteries?
Organic materials have attracted intensive research interest in lithium ion batteries (LIBs) due to their advantages of structural diversity,low cost and sustainability in nature. Here we report a highly conjugated organic framework,poly (imine-anthraquinone) (PIAQ),as the anode material of LIBs.

What is a high performance anode material for lithium and sodium ion batteries?
Conjugated microporous polytetra (2-Thienyl) ethyleneas high performance anode material for lithium and sodium-ion batteries Macromol. Chem. Phys.,219 (2018),p. 1700524

Why are organic batteries better than inorganic batteries?
To meet the demand of the next generation "green batteries" with high capacity and metal-free electrodes,the organic materials due to their resource renewabilities and structure diversities are the desirable alternatives,which may reveal the higher discharge capacity and energy densitythan those of inorganic materials ,.

Can layered organic electrode material compete with inorganic-based lithium-ion battery cathodes?
Here,we describe a layered organic electrode material whose high electrical conductivity,high storage capacity,and complete insolubility enable reversible intercalation of Li +ions,allowing it to competeat the electrode level,in all relevant metrics,with inorganic-based lithium-ion battery cathodes.

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Developing rechargeable electrochemical energy storage (EES) devices represents one of the most promising approaches to achieving high-performance energy storage, since they can provide large-scale and smart-grid energy storage with high levels of efficiency [1,2,3,4,5].Over the past two decades, lithium-ion batteries

(LIBs) have played key roles as ...

In this review, we first systematically introduce the history of aromatic compounds that promote the development of Li-ion batteries. Typical applications of aromatic compounds in Li-ion batteries (e.g., separators, electrolytes, binders, and electrodes) are discussed in detail, and corresponding design characteristics are ...

It is the hot issue for Li-organic battery that whether the higher specific surface area of the porous organic polymers as the electrode materials can benefit to the better battery performance. In this article, the conjugated polymer based on star-shaped benzene-thiophene structure (pBHT) and benzene-ethynyl-thiophene structure (pBAT and pBABT) were designed ...

Many electric vehicles are powered by batteries that contain cobalt -- a metal that carries high financial, environmental, and social costs. MIT researchers have now designed a battery material that could offer a more sustainable way to power electric cars. The new lithium-ion battery includes a cathode based on organic materials, instead of cobalt or nickel (another ...

The organic anodes based on TTD-PDA, TTD-EDA, and GA-PDA for LIBs are discovered to represent high reversible specific capacities of 651, 492, and 416 mAh g -1 at a current density of 100 mA g -1 as well as satisfactory rate capabilities with high capacities of 210, 90, and 178 mAh g -1 and 105, 57, and 122 mAh g -1 at ...

Organic quinone compounds have attracted wide attention due to their high theoretical capacities. Here, a novel cyclic macromolecular calix[6]quinone (C6Q), which possesses 6 p-quinone units and can provide 12 electrochemical active sites, has been applied as a promising cathode material in lithium ion batteries (LIBs). The as-fabricated LIBs exhibited ...

In this study, the 5 mol% LiTFSI (lithium bis(trifluoromethane)sulfonimide)/SN PCE was firstly chosen to match with quinone compound calix[4]quinone (C4Q) to assemble lithium-ion ...

This Account provides a summary of our recent progress, understanding of the fundamentals for high performance organic batteries, insight into the intramolecular and ...

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In recent years, organic materials have been increasingly studied as anode materials in lithium-ion batteries (LIBs) due to their remarkable advantages, including abundant raw materials, low prices, diverse structures,

and high theoretical capacity. In this paper, three types of aromatic Schiff-base polymer materials have been synthesized and examined as ...

In this study, the 5 mol% LiTFSI (lithium bis(trifluoromethane)sulfonimide)/SN PCE was firstly chosen to match with quinone compound calix[4]quinone (C4Q) to assemble lithium-ion batteries (LIBs). The SN-based electrolyte system greatly boosting batteries life ...

High-performance lithium metal batteries enabled by a nano-sized garnet solid-state electrolyte modified separator . Author links open overlay panel Kai Yu a b 1, Huipeng Zeng a 1, Jun Ma a, Yidong Jiang a, Huiyun Li a, Ludan Zhang e, Qiangqiang Zhang e, Xuyi Shan f, Tingting Li g, Xiaoqi Wu a, Hongli Xu a, Wei Huang c, Chaoyang Wang d, Shang-Sen Chi a, ...

Poly(vinylidene fluoride)/SiO2 composite membrane separators for high-performance lithium-ion batteries to provide battery capacity with improved separator properties J. Power Sources, 451 (September 2019) (2020), Article 227759, 10.1016/j.jpowsour.2020.227759

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