Dual-site doped lithium-ion battery

Ni-rich cathodes are very attractive in terms of high-energy density cathodes. However, it still suffers from various disadvantages, making commercialization more difficult. A dual-modifying cathode is a simple and efficient strategy that can have a synergistic effect of surface coating on the outside, and doping can have internal structure stabilization. CSTR-level ...

A lithium-ion or Li-ion battery is a type of rechargeable battery that uses the reversible intercalation of Li + ions into electronically conducting solids to store energy. In comparison with other commercial rechargeable batteries, Li-ion batteries are characterized by higher specific energy, higher energy density, higher energy efficiency, a longer cycle life, and a longer ...

Energy issues have attracted great concern worldwide. Developing new energy has been the main choice, and the exploitation of the electrochemical energy storage devices plays an important role. Herein, a high-performance dual-ion battery system is proposed, which consists of a graphite cathode and SnS2 anode, with a high-concentration lithium salt ...

At present, a-NaFeO2 lithium-rich layered oxides (LLO) as cathode materials for lithium-ion batteries have attracted widespread attention due to their structure and performance characteristics and have become the mainstream research materials for lithium-ion batteries. However, during the charge and discharge process, the irreversible phase transition, ...

LIBs have a high energy density of up to 270 Wh kg -1 or 750 Wh L -1 at the cell level in comparison with 80 Wh kg -1 and 250 Wh L -1 for nickel-metal hydride (NiMH) batteries, while LIBs have a higher energy efficiency over NiMH (?65%) or lead-acid batteries (?70%). [2-4] It is expected that LIBs will continue to dominate the market owing to their high energy density, ...

This is due to the dual-site doping which promotes the transmission of Li + and results in better lithium-ion diffusion kinetics. Therefore, the rate performance of 5F3M sample is better than ...

The existing forms of Cu and S on the surface of the CuS was analyzed by X-ray photoelectron spectroscopy (XPS). The Cu 2p spectrum (Fig. S1a) shows two pair peaks at 932.7/952.4 eV and 933.8/953. ...

Preparation of Ni-Zn dual-doped polyhedral LiMn 2 O 4 for endurable cycling lithium ion batteries at high rate. Author links open overlay panel Linqiao Liang a b 1, Haiyang Liu a b ... Investigations of spinel LiZn x Mn 2-x O 4 (x<=0.03) cathode materials for a lithium ion battery application. Mater. Sci. Eng. B, 238-239 (2018), pp. 93-99 ...

In this report, we demonstrate that the multi-doping using additional Ta dopants into the Al-doped LLZO shifts the most energetically favorable sites of Al in the crystal structure from 24d to 96 ...

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YF 3 /CoF 3 co-doped 1D carbon nanofibers with dual functions of lithium polysulfudes adsorption and efficient catalytic activity as a cathode for high-performance Li-S batteries. ... nanofiber composite membrane with excellent ionic conductivity and wetting mechanical strength towards enhanced lithium-ion battery. Compos. Sci. Technol., 192 ...

Nickel-doped Nb 18 W 16 O 93 nanowires with improved electrochemical properties for lithium-ion battery anodes. Author links open overlay panel ... Zhang et al. also reported that dual-phase Li 4 Ti 5 O 12-TiO 2 delivered a high delithiation capacity of 105 mAh ... A Mo-doped TiNb 2 O 7 anode for lithium-ion batteries with high rate capability ...

Dual ion batteries (DIBs), as a new recharge battery, are researched in the past decade [13], [14]. It has a different working mechanism from the traditional lithium-ion battery, and both anions and cations in the electrolyte participate in the charging/discharging process.

A high-capacity dual-ion full battery based on nitrogen-doped carbon nanosphere anode and concentrated electrolyte. Hongzheng Wu ... tidal energy has triggered the urgent pursuit of cost-effective electrochemical energy storage equipment. 1-3 Although lithium-ion batteries (LIBs) still have the largest market share and are widely used in ...

Ultra-high nickel layered oxide cathode material with high energy density is the most promising material to improve the electrochemical performance of lithium-ion batteries (LIBs). However, the poor structural stability and severe surface/interface side reactions of the material lead to poor rate performance and cyclic stability, which limits its application in ...

Lithium ion batteries (LIBs) have established a dominant position in portable electronic devices and electric vehicles due to their high energy density, superior cycling stability, low self-discharge characteristic, and environmental benignity [[1], [2], [3]].However, the scarcity and uneven distribution of lithium resources leads to a coming fact that LIBs will have ...

Li M, Lu J, Chen Z, Amine K (2018) 30 years of lithium-ion batteries. Adv Mater 30(33):e1800561. Article Google Scholar Roy K, Li TY, Ogale S, Robertson N (2021) Hybrid perovskite-like iodobismuthates as low-cost and stable anode materials for lithium-ion battery applications. J Mater Chem A 9(5):2689-2693

Lithium-rich layered oxide (LLO) cathode materials are considered to be one of the most promising next-generation candidates of cathode materials for lithium-ion batteries due to their high specific capacity. However, some inherent defects of LLOs hinder their practical application due to the oxygen loss and structure collapse resulting from intrinsic anion and ...

Especially, N, S dual-doped carbon enhances the electric conductivity and thus improves the electrochemical performances of the electrode [17]. ... In-situ coupling SnS with nitrogen-doped porous carbon for boosting Li-storage in lithium-ion battery and capacitor. Electrochim. Acta, 365 (2021), Article 137350.

In this study, we synthesized box-like FeS@nitrogen-sulfur dual-doped carbon (NSC) via calcining FeS-FeS 2 @polydopamine (PDA) at 500 °C in argon (Ar). A flow chart of synthesizing the box-like FeS 2 @NSC composite is shown in Fig. 1.NSC layer from carbonization of polydopamine plays an important role in improving lithium and sodium storage performance ...

It is obvious that cation-anion doping has different effects on the crystal structure. This means that dual-site doping can combine the advantages of various doped elements to ...

However, these materials are restricted from being used in commercial lithium-ion batteries due to the problems of poor structural stability and rate capability. In this study, the aluminum and zirconium dual-doped Co-free Ni-rich LiNi 0.96 Mn 0.04 O 2 cathode material (NMAZ) is prepared by a facile high-temperature solid-phase method. The ...

Affected by cobalt (Co) supply bottlenecks and high costs, Co-free Ni-rich layered cathodes are considered the most promising option for economical and sustainable development of lithium ...

Energy storage devices such as lithium-ion batteries (LIBs) have profoundly changed modern ways of living [1, 2], but in the face of sustainability requirements, extensive research has been devoted to developing alternative battery systems [[3], [4], [5]].Among these, dual-ion batteries (DIBs) are emerging as promising candidates [[6], [7], [8]].A prominent ...

Battery-type electrode materials typically suffer from intrinsically slow faradaic reaction kinetics, which severely limits the energy and power density of supercapacitors. Herein, we develop a hybrid of P-doped CoS2 (P-CoS2) ...

Request PDF | Synthesis and electrochemical investigation of lithium and cobalt dual-doped spinel LNMO nanomaterial as cathode for aqueous rechargeable lithium-ion battery | A dual metal-doped ...

Flexible electrode materials with excellent cycle performance and high capacity for lithium ion batteries remain elusive. In this study, we first annealed polypyrrole coatings electrodeposited onto carbon fibre (CF) in nitrogen to obtain N-doped CF (NCF) with a high specific area (84 m 2 g -1).The NCF was treated in sodium azide solution at a hydrothermal ...

Portable electronics and electric vehicles with high energy density and power density are urgently needed due to the rapid growth of the environmental pollution, global population and urbanization and the consumption of traditional fossil sources [1], [2], [3].Lithium-ion batteries (LIBs), as the dominant energy storage devices, have been commercially used ...

Spinel Li 4 Ti 5 O 12 (LTO) is a promising candidate for lithium-ion battery anodes because of its exceptional stability and safety. However, its extensive application is limited by a high ...

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Application of Ta-doped Li 7 La 3 Zr 2 O 12 (LLZTO) to thermal battery could solve overflow safety hazards caused by molten salt electrolytes. However, the capacity of ...

DOI: 10.1021/acsanm.4c00811 Corpus ID: 269306505; Si@Nitrogen-Doped Carbon Nanoparticles for Lithium-Ion Battery Anodes @article{Huang2024SiNitrogenDopedCN, title={Si@Nitrogen-Doped Carbon Nanoparticles for Lithium-Ion Battery Anodes}, author={Wanwen Huang and Jie Gao and Lei Miao and Jianhua Zhou and Guodong Yang and Wenping Liu and Yuanyuan ...

Doping chemistry has been regarded as an efficient strategy to overcome some fundamental challenges facing the "no-cobalt" LiNiO 2 cathode materials. By utilizing the ...

In particular, Li-ion pouch cells with Ta5+- and Mo6+-doped Li[Ni0.91Co0.09]O2 cathodes retain about 81.5% of their initial specific capacity after 3000 cycles at 200 mA g-1.

Owing to the unique virtues of specific energy/power densities, lithium-ion capacitors (LICs) have been increasingly attracting research attention. However, the LICs are greatly restrained by the slow Li+-reaction kinetics of battery-type anodes, which is still a challenging task. In this work, we construct a superior LIC using ultrafine MnO/dual N-doped ...

Abstract SnO2 is considered to be a promising candidate as anode material for lithium ion batteries, due to its high theoretical specific capacity (1494 mAh·g-1). Nevertheless, SnO2-based anodes suffer from poor electronic conductivity and serious volume variation (300%) during lithiation/delithiation process, leading to fast capacity fading. To solve these problems, ...

Benefiting from ultra-high theoretical capacity, silicon (Si) is popular for use in energy storage fields as a Li-ion battery anode material because of its high-performance. However, a serious volume variation happens towards Si anodes in the lithiation/delithiation process, triggering the pulverization of Si and a fast decay in its capacity, which greatly limits ...

A review of nitrogen-doped carbon materials for lithium-ion battery anodes Author links open overlay panel Majid Shaker 1 2, Ali Asghar Sadeghi Ghazvini 3, Taieb Shahalizade 4, Mehran Ali Gaho 5, Asim Mumtaz 6, Shayan Javanmardi 7, Reza Riahifar 8, Xiao-min Meng 2, Zhan Jin 2, Qi Ge 2