

Do lithium-ion batteries suffer from electrode corrosion?

npj Materials Degradation 8, Article number: 43 (2024) Cite this article State-of-the-art lithium-ion batteries inevitably suffer from electrode corrosion over long-term operation, such as corrosion of Al current collectors. However, the understanding of Al corrosion and its impacts on the battery performances have not been evaluated in detail.

Why do lithium batteries get corroded?

Reactive negative electrodes like lithium (Li) suffer serious chemical and electrochemical corrosion by electrolytes during battery storage and operation, resulting in rapidly deteriorated cyclability and short lifespans of batteries. Li corrosion supposedly relates to the features of solid-electrolyte-interphase (SEI).

Why are lithium-oxygen (Li-O) Batteries A problem?

The advancement of lithium-oxygen (Li-O₂) batteries has been hindered by challenges including low discharge capacity, poor energy efficiency, severe parasitic reactions, etc.

Do lithium metal electrodes corrode during battery storage and operation?

Lithium metal electrodes suffer from both chemical and electrochemical corrosion during battery storage and operation. Here, the authors show that lithium corrosion is due to dissolution of the solid-electrolyte interphase and suppress this by utilizing a multifunctional passivation layer.

How to improve the cycle stability of lithium-oxygen batteries?

Lim et al. improved the cycle stability of lithium-oxygen batteries from 65 to 130 cycles by preparing a polyethylene glycol (PEO) film on the lithium metal anode (LMA) and electrochemically precharging it in an oxygen atmosphere.

Are lithium-oxygen batteries a disruptive technology?

Lithium-oxygen (Li-O₂) batteries have the highest theoretical specific energy among all-known battery chemistries and are deemed a disruptive technology if a practical device could be realized (1 - 4).

The Li/CF_x battery with the optimized composite film coated lithium anode exhibits excellent discharge capacity (1006.6 mAh/g, 0.1C) and high-rate capability (639.4 mAh/g, 5C), much higher than those of the uncoated Li/CF_x battery. The discharge specific capacity remains 521.7 mAh/g at 0.1C after stored at 55 °C for 60 days, corresponding to a monthly self-discharge of 1.87 %, ...

As modern society continues to advance, the depletion of non-renewable energy sources (such as natural gas and petroleum) exacerbates environmental and energy issues. The development of green, environmentally ...

Lithium-air batteries (LABs) have attracted extensive attention due to their ultra-high energy density. At present, most LABs are operated in pure oxygen (O₂) since ...

This initial CV stage is limited to a short period, for about 5 min, where the voltage is set to a higher value (even at 4.2 V or 4.3 V) straight away, enabling the battery to draw very high currents such as about 4-5 C-rate (The nominal capacity of a battery denoted as 1C, whereas a fully charged battery discharge at 1C-rate takes 1 h to fully discharge).

Lithium Nitrate/Amide-Based Localized High Concentration Electrolyte for Rechargeable Lithium-Oxygen Batteries under High Current Density and High Areal Capacity Conditions.

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Furthermore, the resting experiment of lithium-oxygen batteries in an oxygen atmosphere further confirms that the SEI layer can inhibit the corrosion of the lithium metal anode in oxygen ...

For the above-mentioned reason, non-carbon materials have been proposed to form the cathode for the lithium-oxygen battery. For example, a free-standing-type Co₃O₄-Ni foam cathode was prepared by coating Co₃O₄ nanorods on the surface of Ni foam without additional carbon supporters [19]. The developed cathode showed a much higher catalytic ...

Despite the presence of cathodic protection, the Ni coating still experiences significant crevice corrosion, as confirmed through chemical aging tests. Mechanistic ...

Based on the measured strategy of photo-assisted promotion of the battery performance of LOBs, we designed a Co₃O₄@NiMoO₄ cathode with a core-shell structure. At a high current density of 1.0 mA cm⁻² and a capacity of 0.5 mAh cm⁻², Co₃O₄@NiMoO₄, as the cathode of the photo-assisted LOBs, has the first charge and discharge overpotential of 1.01 V and a cycle ...

We aim to reveal Al corrosion and resulting battery performance degradation in LIBs, which is significant toward the understanding of the high voltage stability of Al current ...

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