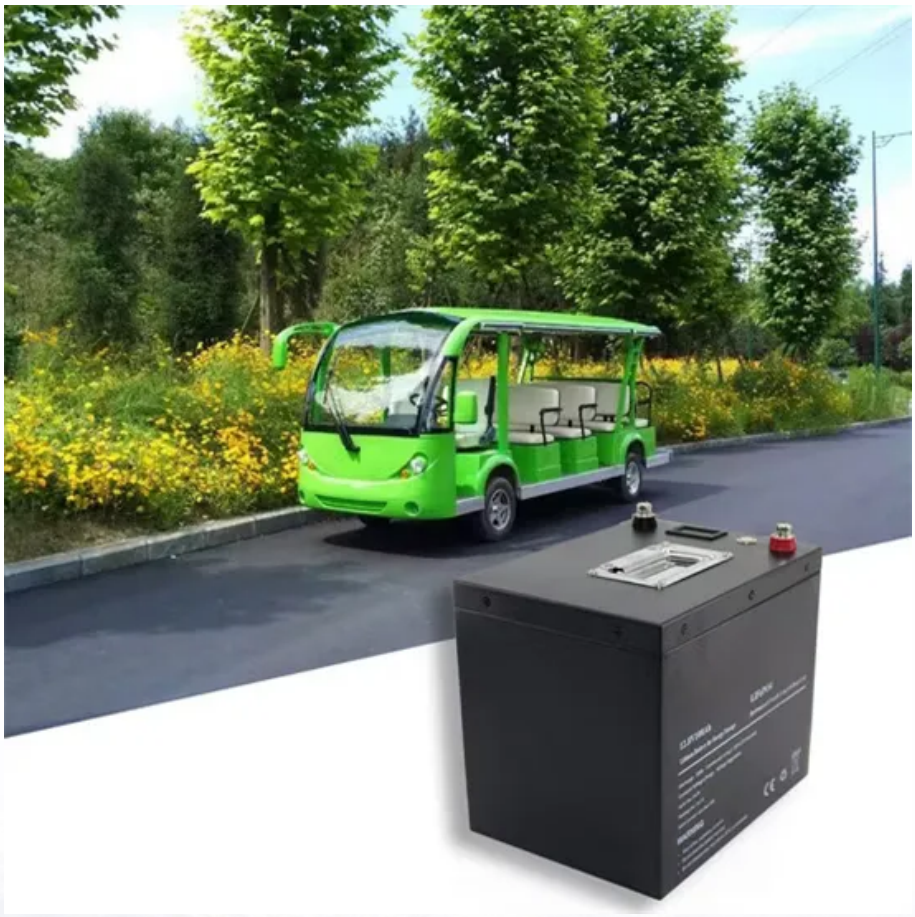
New lithium-oxygen battery can release all stored energy



Overview

By tweaking the building materials, researchers have now constructed a lithium-oxygen battery that can release nearly 100 percent of its stored charge and be recharged at least 150 times.

By tweaking the building materials, researchers have now constructed a lithium-oxygen battery that can release nearly 100 percent of its stored charge and be recharged at least 150 times.

At the heart of this revolution is the lithium battery—a compact powerhouse that stores the energy needed to drive long distances on a single charge. But for all their progress, today’s EV batteries still face limits. Even Tesla, known for pushing boundaries, has batteries that max out at around.

Lithium-oxygen batteries, which are more energy-dense and made of more sustainable materials than typical lithium-ion cells, are promising candidates for the next generation of rechargeable batteries (SN: 1/21/17, p. 22). But lithium-oxygen batteries aren’t widely used yet because they die so. How does a lithium-oxygen battery work?

Discharging the new lithium-oxygen battery instead forms lithium oxide on the cathode (the octahedral crystals, left), allowing the battery to deliver more energy and last longer. In this new battery, oxygen combines with lithium to create lithium oxide. This chemical reaction can store 50 percent more energy than the lithium peroxide reaction.

Do lithium batteries release oxygen after prolonged cycling?

Now, multi-length-scale characterization reveals that oxygen originating from the oxide bulk is eventually released after prolonged cycling. Developing high-capacity cathode materials is essential for the realization of high-energy-density lithium-ion batteries (LIBs).

Does a full-sealed lithium-oxygen battery have oxygen storage layers?

Conclusions In this work, we propose an innovative full-sealed lithium-oxygen

battery (F-S-LOB) concept incorporating oxygen storage layers (OSLs) and experimentally validate it. OSLs were fabricated with three carbons of varying microstructures (MICC, MESC and MACC).

Are lithium-oxygen batteries a good energy storage technology?

Lithium-oxygen batteries (LOBs), with significantly higher energy density than lithium-ion batteries, have emerged as a promising technology for energy storage and power 1, 2, 3, 4. Research on LOBs has been a focal point, showing great potential for high-rate performance and stability 1, 5, 6, 7.

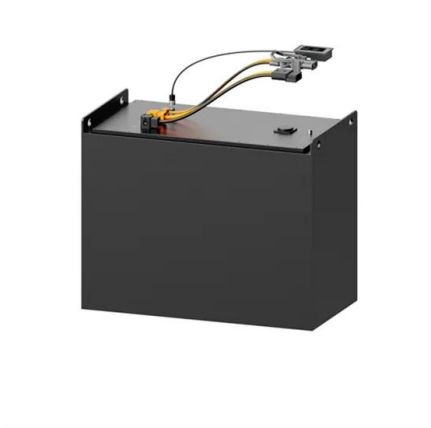
Could a new lithium-oxygen battery pack more energy and last longer?

A new type of lithium-oxygen battery could pack more energy and last longer than its predecessors. Lithium-oxygen batteries, which are more energy-dense and made of more sustainable materials than typical lithium-ion cells, are promising candidates for the next generation of rechargeable batteries (SN: 1/21/17, p. 22).

Are lithium-oxygen batteries a viable alternative to lithium-ion batteries?

This work opens the door for the rules and control of energy conversion in metal-air batteries, greatly accelerating their path to commercialization. Lithium-oxygen batteries (LOBs), with significantly higher energy density than lithium-ion batteries, have emerged as a promising technology for energy storage and power 1, 2, 3, 4.

New lithium-oxygen battery can release all stored energy

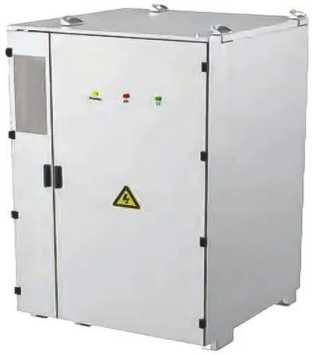


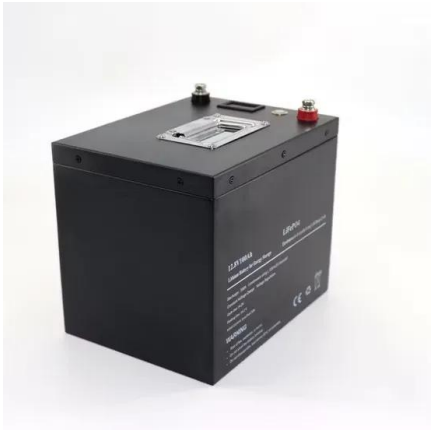
Mechanism and performance of lithium-oxygen batteries - a ...

Rechargeable Li-O 2 batteries have amongst the highest formal energy and could store significantly more energy than other rechargeable batteries in practice if at least a ...

Advances and perspectives in fire safety of lithium-ion battery energy

In this review, we comprehensively summarize recent advances in lithium iron phosphate (LFP) battery fire behavior and safety protection to solve the critical issues and ...





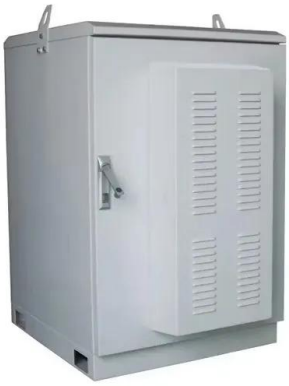
High-Energy Lithium-Ion Batteries: Recent Progress ...

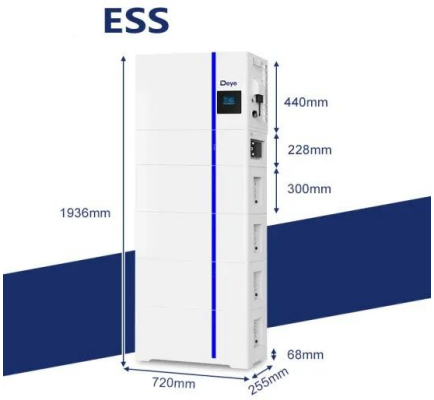
It is of great significance to develop clean and new energy sources with high-efficient energy storage technologies, due to the excessive use of fossil energy ...

Lithium-Oxygen Battery Design and Predictions

The focus is on discovery of new combinations of electrolytes that can promote the cathode functionality of 2-dimensional transition metal

dichalogenide (TMDC) catalysts that have high ...





'Capture the oxygen!' The key to extending ne

The lithium-rich layered oxide (LLO) material offers up to 20% higher energy density than conventional nickel-based cathodes by reducing ...

The Renewable-Energy Revolution Will Need ...

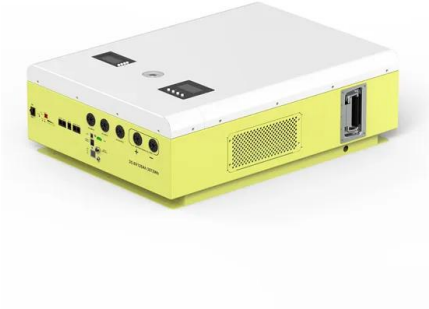
The obvious solution is batteries. The most widespread variety is called lithium-ion, or Li-ion, after the chemical process that makes it work. ...

New type of 'flow battery' can store 10 times the ...

The researchers also modified the conventional flexible membrane material, called Nafion, combining it with another polymer that ...

Lithium-oxygen batteries are getting an energy boost

By tweaking the building materials, researchers have now constructed a lithium-oxygen battery that can release nearly 100 percent of its ...



New Lithium-Oxygen Battery Could One Day Power ...

Scientists have created a battery whose technology in principle could power electric cars and other energy-hungry devices far better than ...

New Oxygen-Ion Battery Could Change Green Energy

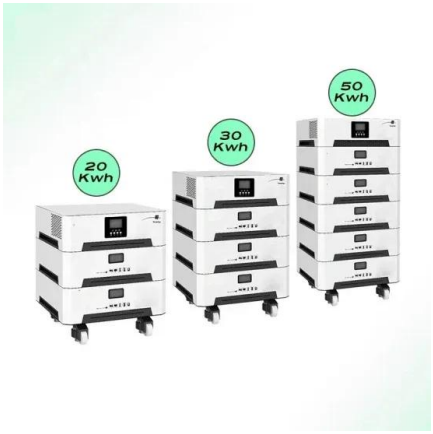
Researchers from Austria have invented a new kind of battery called an oxygen-ion battery. The battery is greener, longer lasting, and less ...

New design for lithium-air battery could offer much ...

New safer battery, tested for a thousand cycles in a test cell, can store far more energy than today's common lithium-ion batteries.

A revolutionary design concept: full-sealed lithium-oxygen batteries

In this work, we propose an innovative full-sealed lithium-oxygen battery (F-S-LOB) concept incorporating oxygen storage layers (OSLs) and experimentally validate it.

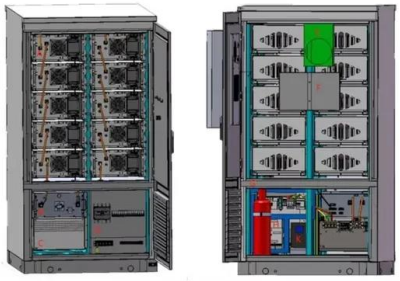


New lithium-oxygen battery greatly improves energy efficiency, ...

It can actually burn if you charge it too fast," he says. Staying solid Conventional lithium-air batteries draw in oxygen from the outside air to drive a chemical reaction with the battery's ...

New lithium-oxygen battery greatly improves energy ...

In a new concept for battery cathodes, nanometer-scale particles made of lithium and oxygen compounds (depicted in red and white) ...

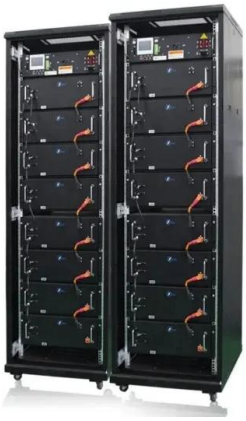


Comprehensive Review of Li-Oxygen Batteries: Electrolytes, ...

A Li-oxygen (Li-O2) battery is a next-generation Li-battery with extremely high theoretical energy density, reaching up to that of a gasoline engine. Unfortunately, practical ...

A long-life lithium-oxygen battery via a molecular ...

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

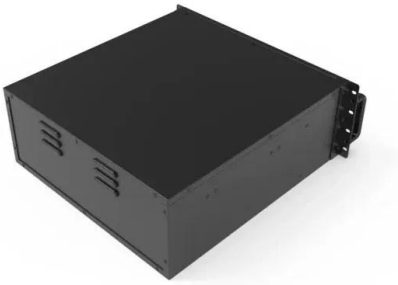


High-energy and fast-charging lithium metal batteries enabled

The electrochemical stability window and Li+ transport limit the energy-dense and fast-charging capability of lithium metal batteries. Here, authors report a trifluoride ether ...

Carbon-capture batteries developed to store ...

Researchers at the Department of Energy's Oak Ridge National Laboratory are developing battery technologies to fight climate change in two ...



'Capture the oxygen!' The key to extending next-generation lithium ...

A research team develops manganese-based cathodes with longer lifespan by suppressing oxygen release. A research team led by Professor Jihyun Hong from the ...

New lithium-oxygen battery greatly improves energy efficiency

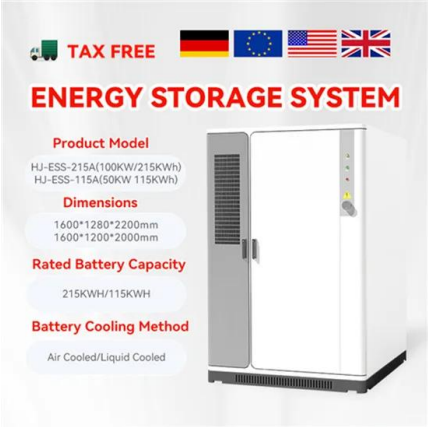
A new kind of lithium-oxygen battery developed at MIT, using glass nanoparticles of lithium oxides, could provide more energy, and much better stability and ...

Nanotechnology Now

In a new concept for battery cathodes, nanometer-scale particles made of lithium and oxygen compounds (depicted in red and white) are embedded in a sponge-like lattice (yellow) of cobalt ...

A battery by any other name: Rethinking energy storage

The term battery doesn't refer to any single technology; fundamentally, a battery is a tool to store energy and release it when and ...



Oxygen-ion batteries may be the future of energy storage

A breakthrough from the Vienna University of Technology -- regenerative oxygen-ion batteries -- may transform the world of energy storage, with the potential to ...

It's in the air - battery discovery takes up the charge

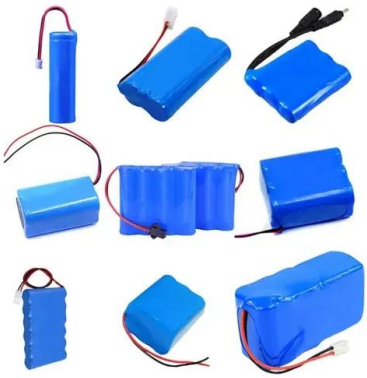
Clean energy researchers have designed a molecule to boost the performance of lithium-oxygen batteries to give electric vehicles the same driving range as petrol-fueled ...

Lithium-oxygen batteries: bridging mechanistic ...

Rechargeable energy storage systems with high energy density and round-trip efficiency are urgently needed to capture and deliver renewable energy for ...

A high-energy-density lithium-oxygen battery based ...

Batteries based on lithium metal and oxygen could offer energy densities an order of magnitude larger than that of lithium ion cells. But, under ...



Recent advances of thermal safety of lithium ion battery for energy

Lithium ion batteries have been widely used in the power-driven system and energy storage system. While thermal safety for lithium ion battery has been constantly ...

Releasing oxygen from the bulk

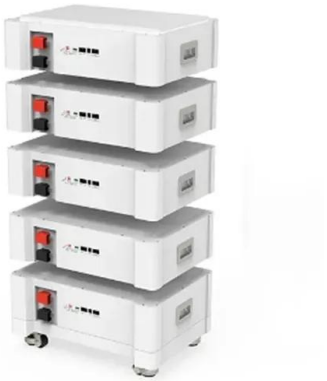
Oxygen loss is an elusive phenomenon that accompanies oxygen redox in lithium-rich layered oxides in batteries. Now, multi-length-scale characterization reveals that ...

Progress in Sealed Lithium-Oxygen Batteries Based on the Oxygen ...

Lithium-oxygen (Li-O2) batteries, which utilize the redox reactions of oxygen anions for charge compensation, have emerged as one of the most promising research areas ...

Electrochemical Energy Storage (EcES). Energy Storage in ...

Electrochemical energy storage (EcES), which includes all types of energy storage in batteries, is the most widespread energy storage system due to its ability to adapt to ...



Experimental comparison of Oxygen Consumption Calorimetry ...

The increased energy release relative to the electrically stored energy may result from the higher amount of combustible material of the cables and the battery pack top cover.

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