

# Breakthrough in battery energy storage materials

Can K-Na/S batteries save energy?

In a new study recently published by Nature Communications, the team used K-Na/S batteries that combine inexpensive, readily-found elements -- potassium (K) and sodium (Na), together with sulfur (S) -- to create a low-cost, high-energy solution for long-duration energy storage.

Can new materials improve battery performance?

Breakthroughs in material upgrades throughout the battery architecture can unlock better battery performance, stability, and sustainability improvements. However, introducing new materials, such as silicon and sulfur, can also bring about new chemical reactions and mechanical stressors.

Are solid-state batteries a viable alternative to traditional batteries?

Solid-state batteries could offer improved stability and energy capacity over traditional battery technologies; however, more research is needed to optimize these batteries for widespread use in vehicle or stationary applications. From chemistry compositions to overall battery structures, the opportunities for battery advancements are endless.

Are lithium-ion batteries good for stationary storage?

But demand for electricity storage is growing as more renewable power is installed, since major renewable power sources like wind and solar are variable, and batteries can help store energy for when it's needed. Lithium-ion batteries aren't ideal for stationary storage, even though they're commonly used for it today.

Is the next generation of battery storage a good idea?

Backed by research at NREL, the next generation of battery storage looks promising. The laboratory's research not only focuses on improving industry-favored Li-ion batteries, but simultaneously continues to explore new opportunities in battery designs.

What is the first level of innovation in battery materials synthesis?

The first level of innovation happens in battery materials synthesis--the stage at which developing or refining materials for new battery designs occurs. At a high level, all batteries have a positive electrode (cathode) and a negative electrode (anode) suspended separately within an electrolyte.

Tunnel Vision Pays Off for Battery-Charging Breakthrough . ... The key is a technique called pre-intercalation, during which the researchers first insert metal ions into the battery material, opening tunnels and creating more space for ions to move around and store more energy. ... "Vanadium oxide has a high capacity for energy storage, is ...

The Push for Innovation in Renewable Energy Storage. The need for efficient energy storage has grown as



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renewable energy sources, such as wind and solar, expand globally. However, less than 10% of the projected global renewable energy storage needs have been met, presenting an urgent demand for innovation. Prof.

The study highlights the innovative work being done at KIT to advance battery technology. By focusing on sodium-ion batteries, researchers aim to develop sustainable and efficient energy storage solutions. This research not only addresses the current needs but also sets the foundation for future advancements in battery materials.

Samsung SDI made a significant announcement at InterBattery 2024, unveiling its novel all-solid-state battery (ASB), indicating a new era in energy storage technology. According to the company, the ASB features an impressive energy density of 900Wh/L, setting a new standard in the industry while pushing the boundaries of possibility in battery technology.

UCLA Leads Innovation in Energy Storage UCLA's Center for Strain Optimization for Renewable Energy, or STORE center, is spearheading advancements to propel sodium ion batteries into mainstream markets. With a budget of \$4.5 million funded by the Department of Energy's Energy Earthshots program, this initiative aims to mirror lithium ion ...

01/12/2023 January 12, 2023. A small company in Germany has developed a large-scale battery that does not require rare materials. The energy storage device doesn't require lithium, cobalt or ...

Credit: Adam Malin/ORNL, U.S. Dept. of Energy. When electricity flows through a battery, the materials inside it gradually wear down. The physical forces of stress and strain also play a role in this process, but their exact effects on the battery's performance and lifespan are not completely known.

Researchers make performance breakthrough with sodium-ion battery technology: "A highly promising material for future energy-storage solutions" Rick Kazmer June 5, 2024 at 6:30 AM &#183; 3 min read

Scientists have created an anode-free sodium solid-state battery. This brings the reality of inexpensive, fast-charging, high-capacity batteries for electric vehicles and grid storage closer than ...

For the past decade, disordered rock salt has been studied as a potential breakthrough cathode material for use in lithium-ion batteries and a key to creating low-cost, high-energy storage for everything from cell phones to electric vehicles to renewable energy storage. A new MIT study is making sure the material fulfills that promise.

4 &#0183; The value of molten salt storage is mainly reflected in three aspects: improving the utilization rate and stability of renewable energy storage, solving the coordination problem between wind, solar, fire and other energy sources;. Realizing grid peak shaving and valley filling, system frequency regulation, load smoothing, etc. function to improve the security and ...

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The International Energy Agency just released a new report on the state of critical minerals in energy, which has some interesting battery-related tidbits. So for the newsletter this week, let's ...

In 2021, Li and his team offered one way to deal with dendrites by designing a multilayer battery that sandwiched different materials of varying stabilities between the anode and cathode. This multilayer, multi-material design prevented the penetration of lithium dendrites not by stopping them altogether, but rather by controlling and ...

Today, the market for batteries aimed at stationary grid storage is small--about one-tenth the size of the market for EV batteries, according to Yayoi Sekine, head of energy ...

From more efficient production to entirely new chemistries, there's a lot going on. The race is on to generate new technologies to ready the battery industry for the transition ...

Smartphone battery leader says new material will boost energy storage for smaller gadgets first The breakthrough is the latest step forward for a technology industry experts think can ...

It outlines strategies to encourage faster adoption and globally scaled manufacturing of innovative battery and storage technology ecosystems. It is clear that breakthrough battery technologies will play a central role in our energy system sooner than previously thought possible, creating diverse opportunities for value creation and capture in ...

Sugar additive plays a surprise role, boosting flow battery capacity and longevity for this grid energy resilience design. A team of researchers from the Department of Energy's Pacific Northwest National Laboratory (PNNL) has made a significant breakthrough in flow battery design using a common f

1) Battery storage in the power sector was the fastest-growing commercial energy technology on the planet in 2023. Deployment doubled over the previous year's figures, hitting nearly 42 gigawatts.

Columbia Engineering material scientists have been focused on developing new kinds of batteries to transform how we store renewable energy. In a new study published September 5 by Nature ...

KAIST has unveiled a groundbreaking development in energy storage technology. A research team led by Professor Kang Jeong-gu from the Department of Materials Science and Engineering has created a high-energy, high-power hybrid Sodium-ion Battery. This next-generation battery boasts rapid charging capabilities, setting a new precedent for ...

Aug. 24, 2022 -- Engineers have designed a battery made from inexpensive, abundant materials, that could provide low-cost backup storage for renewable energy sources. Less expensive than lithium ...

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Ma says the so-called water batteries are at the cutting edge of an emerging field of aqueous energy storage devices, with breakthroughs that significantly improve the technology's performance ...

This semiconducting material, then, allows the energy storage, with a density up to 19 times higher than commercially available ferroelectric capacitors, while still achieving 90 percent ...

Researchers at MIT have developed a cathode, the negatively-charged part of an EV lithium-ion battery, using "small organic molecules instead of cobalt," reports Hannah Northey for Energy Wire. The organic material, "would be used in an EV and cycled thousands of times throughout the car's lifespan, thereby reducing the carbon footprint and avoiding the ...

Energy storage devices have become indispensable for smart and clean energy systems. During the past three decades, lithium-ion battery technologies have grown tremendously and have been exploited for the best energy storage system in portable electronics as well as electric vehicles. However, extensive use and limited abundance of lithium have ...

With its high current density, the battery could pave the way for electric vehicles that can fully charge within 10 to 20 minutes. The research is published in Nature. Associate Professor Xin Li and his team have designed a ...

Unlike conventional lithium-ion batteries, these materials are non-flammable, eliminating the risk of fires or explosions. The battery operates optimally at around 230°F, achieving charging rates ...

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