

Rechargeable lithium-ion batteries can exhibit a voltage decay over time, a complex process that diminishes storable energy and device lifetime. Now, hydrogen transfer ...

Scientists identified a new mechanism causing lithium-ion battery self-discharge and degradation: cathode hydrogenation. They revealed how protons and electrons from the electrolyte impact the cathode.

In conclusion, the study examined how hydrogen is stored and released in LiCoO_2 cathode materials used in lithium-ion batteries. This work opens the door for the creation of more effective batteries and the low-energy ...

However, our study has shown that it is the diffusion of protons (hydrogen ions) that is causing a battery's self-discharge. Based on the results of this study, it is possible to propose ways to extend the life of the battery by reducing self-discharge.

Characteristics such as high energy density, good cycling ability, high operating voltage and low self-discharge are pivotal in making lithium ion batteries the leading technology for these applications. As such, there is a desire to increase energy density further to improve the range of electric vehicles.

This happens when lithium in the battery reacts with moisture in the air. Lithium reacts with water to form hydrogen gas and lithium hydroxide. Since lithium is so reactive with water, lithium ion batteries must be air-tight so that water can't get in, but sometimes it gets in anyways. The reaction of lithium with water releases a lot of heat ...

The team found hydrogen atoms are formed due to a reaction between the electrolyte and the cathode after the battery is fully charged. These atoms bind to the cathode where lithium would...

The majority of researchers believe that the hydrogen is released due to reduction of residual moisture on an anode in line with the formula $\text{H}_2\text{O} + \text{e}^- \rightarrow \text{OH}^- + 1/2 \text{H}_2$

Using the Advanced Photon Source, a powerful X-ray machine, at the U.S. Department of Energy's Argonne National Laboratory in Illinois, the research team discovered that hydrogen molecules from the battery's electrolyte would move to the cathode and take the spots that lithium ions normally bind to. As a result, lithium ions have fewer places to bind to on the ...

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In conclusion, the study examined how hydrogen is stored and released in LiCoO_2 cathode materials used in lithium-ion batteries. This work opens the door for the creation of more effective batteries and the low-energy production of hydrogen by water splitting, an ecologically benign method of energy storage!

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