

Spent lithium ion batteries

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A research team led by Dr. Jung-Je Woo at the Gwangju Clean Energy Research Center of the Korea Institute of Energy Research (KIER) has successfully developed a cost-effective and eco-friendly technology for recycling cathode materials from spent lithium-ion batteries.

With the recent rise in electric vehicles and mobile devices, managing spent batteries has become a critical global challenge. By 2040, the number of decommissioned electric vehicles is expected to exceed 40 million, leading to a sharp increase in waste batteries. Developing advanced recycling technologies has thus become an urgent priority, as the metals in batteries pose a significant risk of soil and water contamination.

In conventional battery recycling, the typical method involves crushing spent batteries and extracting valuable metals such as lithium, nickel, and cobalt through chemical processes. However, this process requires high-concentration chemicals, which generate wastewater, and it demands substantial energy consumption due

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to the need for high-temperature furnaces that contribute significantly to carbon dioxide emissions.

To address these issues, direct recycling technology, which recovers and restores original materials without chemical alteration, has been attracting growing interest. However, direct recycling also has drawbacks, as it requires high-temperature and high-pressure conditions and involves complex procedures, making it both time-consuming and costly.

The research team has developed a novel technology for directly recycling spent cathode materials from lithium-ion batteries through a simple process that addresses the limitations of conventional recycling methods. This innovative approach restores the spent cathode to its original state by immersing it in a restoration solution under ambient temperature and pressure, effectively replenishing lithium ions.

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