



ELECTROCHEMICAL LITHIUM EXTRACTION AND RECOVERY

[View U.S. Patent Application Publication No. US-2025-0215577 in PDF format.](#)

WARF: P240162US01

Inventors: Kyoung-Shin Choi, Dohwan Nam, Brian Foster, Ryan Belson, Princess Merenini

The Invention

UW-Madison researchers have developed a new electrochemical method to recover Li from spent lithium-ion battery (LIB) materials as high purity Li-containing chemicals with a high yield in an efficient and environmentally benign manner. LiFePO_4 is the most inexpensive, relatively non-toxic, and thermally stable cathode material that is widely used in electric vehicles (EVs). In a Li removal/recovery cell, Li^+ is first leached from spent LiFePO_4 electrodes in a phosphoric acid solution whose composition is optimized for efficient Li leaching ($\text{pH} < 3$). Then, Li^+ and phosphate in the solution are selectively stored in a Li-storage electrode and a phosphate-storage electrode, respectively, by the operation of the Li removal cell. Once the electrodes are saturated with respective ions, they release these stored ions in a different solution whose $\text{pH} (> 5)$ is adjusted so that the released Li^+ and phosphate are precipitated as pure $\text{Li}_3\text{PO}_4(\text{s})$, which can be used to make new LiFePO_4 electrodes. The operation of these cells proceeds at ambient pressure and temperature and produces Li_3PO_4 by a simple two-step process with minimal requirement of chemicals and minimal generation of waste.

Additional Information

For More Information About the Inventors

- [Kyoung-Shin Choi](#)

Publications

- [Read a news story about this technology.](#)

Tech Fields

- [Clean Technology : Energy storage, delivery & resource efficiencies](#)
- [Clean Technology : Monitoring, remediation & waste reduction](#)

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854