

TECH OFFER

Hydrometallurgy For Recovery Of Critical Metals And Graphite In Lithium-Ion Batteries



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Low Carbon Economy

Sustainability - Circular Economy

Energy - Battery & SuperCapacitor

TECHNOLOGY READINESS LEVEL (TRL): TRL5

COUNTRY: UNITED KINGDOM

ID NUMBER: TO174751

OVERVIEW

Electric Vehicles (EVs) are the up-and-coming alternative to internal combustion engines and the market have been projected to grow at an average of around 50% per year. Due to the rapid development and commercialization of EVs, the lithium-ion battery (LIB) market is growing exponentially along with the metals used in the batteries, such as lithium, cobalt, manganese, nickel. However, one major challenge is that the indispensable battery metals are in extremely short supply, and there is a need for a cost-effective and environmentally friendly way of obtaining these materials.

This technology offer is a hydrometallurgical recycling method that can recover 80% of the battery value, which is 10% more efficient than current conventional recycling methods. It can recover over 95% of critical cathode metals such as lithium, nickel, cobalt and manganese in a quality and format for direct reuse and manufacturing of new LIBs. It is able to recover high-value non-metallic components such as graphite for the battery anode as well. In addition, for every 1 kg of spent battery recycled, 2.5 kg of carbon dioxide (CO₂) is saved allowing for carbon credits generation as well.

The technology owner is seeking partners who are interested to further co-develop or license this technology, especially those in the recycling, mining, commodity trading companies and automotive OEM/battery manufactures. They are also looking for companies with an interest to invest in or build a LIB recycling plant.

TECHNOLOGY FEATURES & SPECIFICATIONS

This technology offer is a hydrometallurgy method of recycling critical metals and graphite from LIBs. The features and specifications of the technology are as follows:

- Hydrometallurgy (no carbon emission or heavily reliance on water)
- Recovery of critical metals (lithium, nickel, cobalt, and manganese) and graphite
- Ecofriendly process (recovery via bioleaching with bacteria)
- Metal separation by selective precipitation
- Electrolyte salt removed using solvent extraction
- Graphite extracted as a solid from leach residue
- Over 95% cathode metals recovery
- Direct production of ready-to-use active cathode materials (no additional processing)
- Carbon credits generated from using recycled materials

POTENTIAL APPLICATIONS

This technology is applicable for industries which are interested in the recovery of materials from LIBs. The potential applications are:

- Recovered metals can be directly used to manufacture new LIBs (for EVs, consumer electronics, e-bikes etc.)
- Recovered graphite can be used for industrial and battery applications

UNIQUE VALUE PROPOSITION

- 80% recovery of LIBs value
- Hydrometallurgy (no carbon emission, mild reaction conditions)
- Development of bioleaching (ecofriendly)
- Direct reuse of recovered materials (lithium, nickel, cobalt, and manganese)
- Recovery of graphite in anode
- Carbon credits generation