

Sustainable hydrometallurgy for sodium-ion: ready before the wave arrives



revitalise-project.eu

Sodium-ion cells are emerging as a promising lower-cost alternative to conventional lithium-ion technologies. However, end-of-life volumes suitable for recycling are still expected to remain limited in the near term, and only a small number of recyclers have developed dedicated and validated treatment routes for these chemistries.



REVITALISE has extended its sustainable hydrometallurgical recycling approach to sodium-ion battery materials by adapting the low-toxicity and low-energy leaching principles developed for lithium-ion cathodes to the specific composition and structure of sodium-ion cathode materials. The process enables the recovery of valuable metals from cathode active materials (CAM), including sodium, iron, nickel and manganese, supporting the development of dedicated recycling solutions for emerging sodium-ion battery technologies.

	26 Fe Iron 55.85	
28 Ni Nickel 58.69	25 Mn Manganese 54.94	11 Na Sodium 22.99

RESULTS IN PRACTICE

- Recovery route for nickel and manganese, key precursors for battery manufacturing
- Same green chemistry principles as the lithium-ion route, proven to transfer across chemistries
- Positions recyclers ahead of the sodium-ion volumes still to reach end of life

>99%
recovery

Ni-Mn oxalate

PAIN POINTS ADDRESSED

- Risk of being caught without a process when sodium-ion volumes hit the recycling stream
- Uncertainty over whether to invest now for a chemistry that hasn't scaled yet
- Lack of an established recovery benchmark for sodium-ion battery chemistries

>99%
purity

Ni-Mn oxalate

TECHNOLOGY IN DETAIL

How it works

A low toxicity leaching process. Sodium-ion CAMs undergo a simple pre-treatment to remove aluminium contaminants and are then leached with citric acid to dissolve sodium, iron, nickel and manganese. Nickel and manganese are recovered through oxalic acid precipitation as a mixed oxalate precursor suitable for new battery manufacturing, and the remaining sodium- and iron-containing solution can be further processed for additional resource recovery.

What goes in

Composition in = composition out. Sodium ion CAMs go in: the process has proven to be robust to a variety of elemental compositions. However, it's recommended to recycle similar materials together, to ensure the output salts can be used directly for re-manufacture of electrodes. In this way, the number of process steps (and process cost) is minimised.

What comes out

High recovery rates and high purity. The main output is a mixed nickel-manganese oxalate precursor with high purity - suitable for new battery manufacturing.

What sets it apart

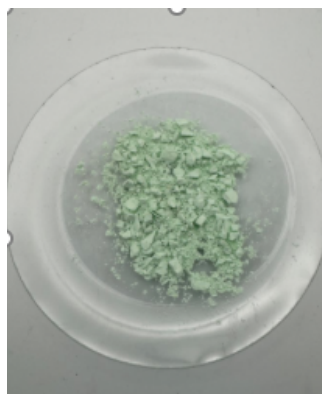
Get ahead of the chemistry transition. The process replaces conventional mineral-acid leaching with a low-toxicity citric acid approach and recovers nickel and manganese as a battery precursor material. It provides a dedicated recycling route for sodium-ion batteries, for which few validated recovery processes currently exist.

Partner contact information: Eurecat. Albert Martinez Torrents.

Email: albert.martinez@eurecat.org



Leaching solution



Final recovery product: Ni-Mn mixed oxalate

revitalise-project.eu

OUR PARTNERS



FUNDED BY



Co-funded by the European Union and Innovate UK. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Innovate UK. Neither the European Union nor Innovate UK can be held responsible for them.

