COMET FACTSHEET

COMET MODULE

FULIBATTER – FUTURE LITHIUM-ION-BATTERY RECYCLING FOR RECOVERY OF CRITICAL RAW MATERIALS

Main location: Linz (Upper Austria))
Other locations: Leoben (Styria)
Thematic area: Material & Production
(according to *www.ffg.at/comet/netzwerk)*

Thematic focuses

- Waste management and waste technological approaches for lithium-ion-battery (LIB) recycling
- Pyrometallurgical processing of LIBs and black matter
- Bio-hydrometallurgical treatment of LIB residues

Planned realisation and outcomes

The focus of FuLIBatteR is to recover critical raw materials from the active material (also called black mass) of lithium-ion batteries (LIB) of different application areas (automotive, stationary and portable storage media) to closed-loop material cycles.

Current recycling processes mainly focus on mechanical processing to separate cases, cables, and other coarse components. The largest mass fraction of LIB after reprocessing, the fine-grained active material (up to 70% by weight of the battery mass), contains the critical elements, like lithium, phosphorus, cobalt, silicon and graphite, but also economically important metals, such as copper, nickel, and manganese in varying concentrations, depending on the battery type. Currently, many of the elements mentioned are not selectively recovered and end up in waste gas or the slag fraction after pyrometallurgical treatment or dissolved in wastewater after hydrometallurgical processes.

The amendment to the EU Battery Regulation will mandate higher recycling efficiencies (65% in 2025 and 70% in 2030) and recovery rates for lithium (35% for 2025 and 70% for 2030) and cobalt, nickel, and copper (90% for 2025 and 95% for 2030).

In the first subproject, froth flotation will be used to separate the graphite in high quality and at the same time improve the recyclability of the metal oxides. Characterization of the separated graphite will provide information on its quality and usability in battery cell production or in other applications (carburizing agent in the steel sector or secondary raw material in refractories production).

In a second subproject, on the one hand the thermal deactivation of LIB cells wil be investigated by means of CFD simulations. On the other hand, a reducing pyrometallurgical process will be developed to separate a metal alloy containing cobalt, nickel and copper, and to recover the valuable materials lithium and phosphor via the gas phase. The metal alloy will be evaluated for use as an alloying additive for special steel production.

In the third development line (3rd subproject), the concept of biohydrometallurgy will be applied. Microorganisms will be used to extract metals from the matrix (bioleaching) coupled with selective element recovery. Bioelectrochemical systems (BES) offer a sustainable method for recovering metals from leachates with lower energy requirements compared to conventional electrolysis cells.

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Selected company partners (max. 10)**:**

1. BRAIN Biotech
2. VTU Group GmbH
3. Ebner Industrieofenbau
4. RHI Magnesita
5. Saubermacher Dienstleistungs
6. TÜV SÜD Landesgesellschaft Österreich
7. voestalpine High Performance Metals

Selected scientific partners (max. 5)**:**

1. acib (Austrian Centre of Industrial Biotechnology)
2. Montanuniversität Leoben
3. University of Natural Resources and Life Sciences (Department of Agrobiotechnology IFA Tulln)

Selected international[1] partners (max. 5)**:**

1. AUDI
2. Coventry University
3. UVR-FIA

Duration:	01.07.2022 - 30.06.2026 (4 years)
Staff employment:	8 FTE, thereof 7 scientists
Management:	Lukas Schmidt, Team Lead
Contact:	K1-MET Stahlstrasse 14, Linz 4020 +43 732 6989 75607 www.k1-met.com www.k1-met.com/en

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[1] Partners with headquarters outside Austria