

FuLiBatter
Future Lithium Ion Battery Recycling
for Recovery of Critical Raw Materials.

Programme:
COMET – Competence Centers for
Excellent Technologies

Programme line: COMET-Module

Type of project: 01.07.2022 -30.06.2026,
multi-firm



EVALUATION OF MATERIAL RECOVERY ROUTES

ASSESSMENT OF FULIBATTER RECYCLING PATHWAYS FOR BLACK MASSES DERIVED FROM LITHIUM-ION BATTERIES TO RECOVER CRITICAL RAW MATERIALS AND OTHER VALUABLE ELEMENTS

One of the final milestones of the COMET Module FuLiBatter focused on identifying and validating efficient methods for recovering black mass from end-of-life Lithium-Ion Batteries (LIBs). In the final phase of the Module, the project partners focused on analyzing data from the experiments conducted within the frame of the three subprojects to evaluate the recovery processes under investigation. The goal was to determine the most efficient process pathway for the recovery and purification of critical raw materials. The activities carried out provided a systematic experimental evaluation of froth flotation, pyrometallurgical, hydrometallurgical, and biohydrometallurgical processes regarding their potential for comprehensive (completeness of) material recovery.

Impact and effects

Typical for most of the state-of-the-art LIB recycling processes, collection is the first step followed by sorting and mechanical processing to separate the black mass from the remaining battery components. Building on this approach, an integrated recycling concept was developed, which combines process engineering, metallurgy, and biotechnology to maximize resource recovery. Figure 1 provides an overview of the process steps examined.

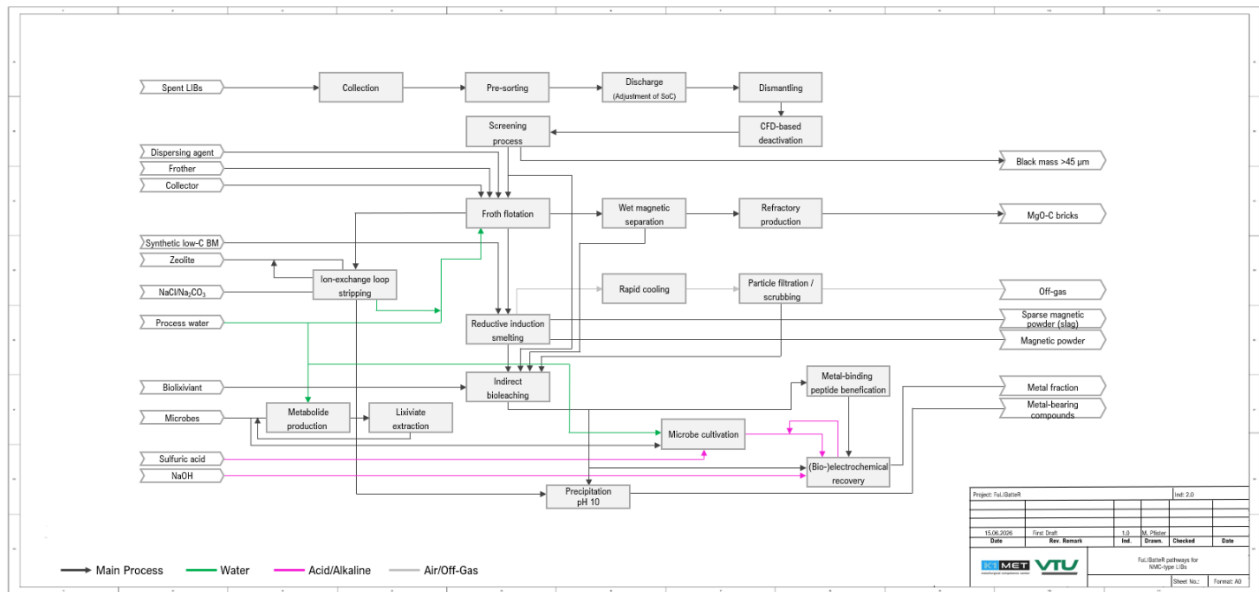


Figure 1: Schematic representation of the recycling pathways in the FuLiBatter project for the recovery of critical raw materials (Source: K1-MET, FuLiBatter Consortium).

The proposed recycling concept shown in Figure 1 includes battery deactivation, flotation, magnetic separation, thermal pretreatment, (bio)leaching, refining, and metal recovery. Several of these technologies achieved very good results in terms of recovering high-purity, usable materials. Overall, the results show promising recycling efficiencies and recovery rates for graphite, lithium, cobalt, nickel, and manganese. This demonstrates the significant potential of the FuLiBatter approach to meet both current and future recycling targets set by the European Union, thereby supporting a more sustainable supply of critical raw materials.

Project coordination (Story)

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Project partner

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- Ebner Industrieofenbau GmbH, AT
- RHI Magnesita GmbH, AT
- Saubermacher Dienstleistungs AG, AT
- TÜV SÜD Landesgesellschaft Österreich GmbH, AT
- voestalpine High Performance Metals GmbH, AT
- VTU Engineering GmbH, AT
- acib GmbH, AT
- BOKU University, AT
- Technical University of Leoben, AT
- University Coventry, UK
- UVR-FIA GmbH

This success story was provided by K1-MET and by the mentioned project partners for the purpose of being published on the FFG website. FuLiBatter is a COMET-Module within the COMET – Competence Centers for Excellent Technologies Programme and funded by BMIMI, BMWET, and the provinces Upper Austria and Styria. The COMET Programme is managed by FFG. Further information on COMET: www.ffg.at/comet