Faculty of Material Sciences and
Material Technologies
Institute for Nonferrous Metallurgy

MASTER THESIS

Critical raw materials recovery from different End-of-Life product streams

Introduction

In pursuing sustainability, attention to the end-of-life phase of products (i.e., auto-/electrocatalysts, fuel cells, PCBs, LFP and NMC batteries) is crucial, requiring the development of effective recycling strategies. Critical raw materials (CRMs) such as lithium, cobalt, nickel, manganese and platinum group metals are essential for clean energy and high-tech applications but are often sourced from environmentally damaging mining practices in numerous places across the globe. By leveraging EoL product streams, the negative impacts can be mitigated and a sustainable supply can be secured for the valuable resources in the EU. The main purpose of the thesis is to address recycling challenges by exploring hydrometallurgical processes for efficient metal recovery and purification. Aqueous solutions will be investigated to selectively leach target metals from EoL product streams and subsequently purify them through different refining techniques. The leaching process will involve using acidic and alkaline solutions to dissolve target metals into an aqueous phase and adjusting parameters such as pH, specific reagents, time and temperature. Precipitation methods will be employed to selectively recover target metals in a pure form. The overall goal is to develop an economically viable and sustainable method to recover high-purity metals, therefore reducing dependency on primary raw material sources.

Tasks

- Literature review on state-of-the-art hydrometallurgical processes for CRMs recovery.
- Design and performing laboratory experiments to optimize leaching and precipitation parameters.
- Use software (e.g. HSC-Sim, OLI) to model the process steps and to predict the behavior of elements.
- Analyze, interpret and report experimental data.

Requirements

- Background in chemistry/chemical engineering/materials science.
- Prior basic experience in laboratory.
- Proficiency in data analysis i.e., software tools for statistical analysis and process optimization.
- Duration: 6 months (Start date can be discussed).

Benefits

- Hands-on research experience in hydrometallurgical techniques.
- Opportunity to gain experience in different analyzing techniques.
- Career advancement in the field of environmental technology and recycling.
- Possibility of publishing successful results in journals.

Contact

If you have any further questions or interested to apply, please contact:

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