Faculty of Material Sciences and
Material Technologies
Institute for Nonferrous Metallurgy and Purest
Materials

MASTER THESIS

Simulation-based LCA of Rare Earth Oxides production

Introduction

Rare Earth Oxides are key for several technological developments. However, their primary production is still limited to a few countries. Understanding the pathways for Rare Earth Oxides production and calculating their environmental impacts through simulation-based Life Cycle Assessment (LCA) is essential for a reliable assessment. This master thesis aims to review the primary production of Rare Earth Oxides, validate the flow sheets with industrial partners, and simulate these processes. Using simulation-based LCA, the impacts are assessed, and the key drivers of environmental hotspots are identified.

Tasks

- Literature review and process flow sheet definition
- Definition of Goal and Scope of LCA
- Data collection and life cycle inventory analysis
- Creation of HSC simulation models, supported with FactSage and OLI software information
- Calculation of impacts using HSC Sim and openLCA software
- Analysis, interpretation, and reporting of the analysed data

Requirements

- ✔ Basic knowledge of metallurgy/material science/chemistry or related fields
- ✔ Experience and/or interest in working with LCA (e.g., openLCA) and Simulation (e.g., HSC Sim)
- ✔ Start Date: March 2025, Duration: 6 months

Benefits

- ❖ Opportunity to develop the topic in partnership with Minviro (UK-based LCA consultancy and software company)
- ❖ Opportunity to gain experience in Simulation-based LCA
- ❖ Possible HiWi position
- ❖ Possible publication of the relevant results

Contact

If you have any further questions or are interested to apply, please contact:
Prof. Dr.-Ing. Alexandros Charitos (Email: alexandros.charitos@inemet.tu-freiberg.de)
Dr. rer. nat. Lesia Sandig-Predzymirska (Email: Lesia.Sandig-Predzymirska@inemet.tu-freiberg.de)
M.Sc. Sahin Alacacayir (Email: sahin@minviro.com)

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Prof. Dr.-Ing. Alexandros Charitos, Institute Director, INEMET