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School of Chemical Engineering

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Defence announcement 2023

Public Defence on 01 December

Chemical extraction of metals from Li-ion batteries

Title of the doctoral thesis	Hydrometallurgical recycling of Li-ion batteries
Content of the doctoral thesis	This dissertation delves into extensive research conducted on the development of innovative methods for recycling Li-ion batteries and reclaiming valuable metals. With the ongoing electrification and energy transition, there is a notable surge in the use and applications of Li-ion batteries, consequently escalating the demand for metals such as lithium, cobalt, and graphite. This heightened reliance on battery materials places substantial strain on mining resources. Mining alone cannot provide the materials for the future demand, therefore the need to develop new battery recycling technologies is crucial. The insights presented in this thesis offer a comprehensive understanding of the dissolution of crushed battery concentrate in acid, shedding light on the role of various additives and impurities in enhancing the extraction performance from solid concentrate to the liquid phase. A distinctive method for precipitating impurities from the solution is thoroughly explored, along with an investigation into materials characterization and graphite recovery. This thesis contributes directly to the body of research on metal recovery from batteries. Notably, the test conditions and novel materials examined in this work are chosen with a deliberate focus on their practical integration within the existing hydrometallurgical industry, particularly in sulfate media.
Field of the doctoral thesis	Processing of materials
Doctoral candidate and contact information	M.Sc. (Tech.) Alexander Chernyaev e mail alexander.chernyaev@aalto.fi
Public defence date and time	01 December 2023 at 12 o'clock (in Finnish time)
Place of public defence	Aalto University School of Chemical Engineering, Circular Raw Materials Hub, lecture hall Aluminium, Vuorimiehentie 2, Espoo
Opponent(s)	Andrea Miškufová, Technical University of Košice, Slovakia
Custos	Mari Lundström, Aalto University School of Chemical Engineering
Link to electronic thesis	http://urn.fi/URN:ISBN:978-952-64-1566-6
Keywords	Recycling, hydrometallurgy, Li-ion battery, leaching, precipitation, graphite

Dissertation will be on public display at https://aaltodoc.aalto.fi/doc_public/eonly/riiputus/