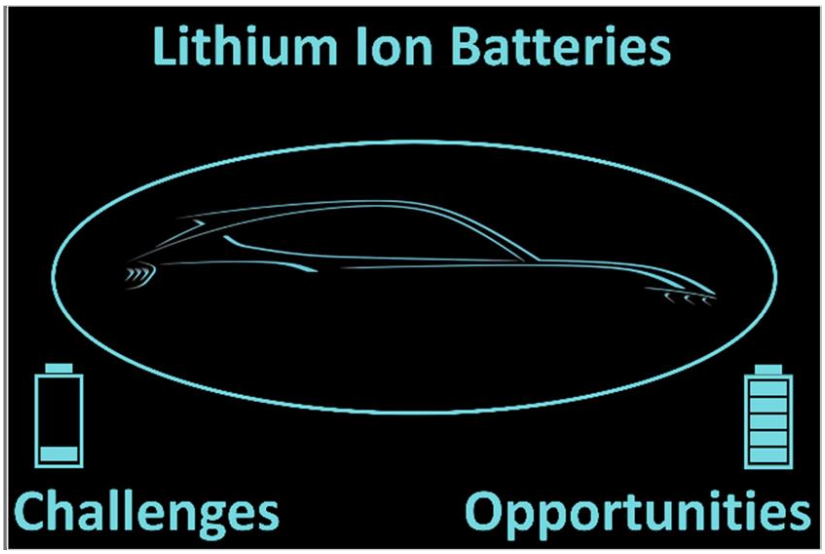
Kandidatarbete
Examenskod IMSX16-23-07

CHALMERS | Institutionen för INDUSTRI- OCH MATERIALVETENSKAP



Bildtext

Challenges and opportunities of lithium ion battery and future batteries

Lithium-ion batteries (LIBs) have become one of the main energy storage technologies in the modern society. The application fields and market share of LIBs increased rapidly. The challenges, developments, and opportunities of current LIBs and future batteries need to be understood and investigated especially in terms of the sustainability.

Today, LIBs are the dominated energy storage technology in many applications for example portable electronics, electric vehicles, and future energy storage systems. The ever-increasing demand for better performance, particularly higher energy densities, sustainability, and lower costs, has triggered research into future battery technologies such as solid-state lithium metal, lithium–sulfur and sodium-ion batteries. Currently, these technologies are being intensively studied with regard to material chemistry and cell design. This project will focus on the knowledge in those fields with the goal to understand the current needs of Sweden battery industry, starting with a market outlook and an analysis of technological differences, further discussing the battery manufacturing processes, and followed by fabricating batteries in the labs.

- Survey the energy storage market of Sweden and define the most possible future battery.
- Review the sustainable material for the battery, and answer how to improve battery design in terms of sustainability.
- Life cycle assessment of electric vehicle batteries.
- Fabricate and assemble battery in the labs by yourself.
- Evaluate the performance of the battery fabricated by you.

Målgrupp
M, K, KF, E, F, BT

Gruppstorlek
3-6

Speciella förkunskaper
- Basic knowledge in materials science and engineering;
- Background in mechanical and engineering,
- Physics, chemistry and engineering

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Kan det dubbleras?
No

Reference:
[1] A. Masias*, J. Marcicki, and W. Paxton, Opportunities and Challenges of Lithium Ion Batteries in Automotive Applications, ACS Energy Lett. 2021, 6, 2, 621–630