UiA Videre – Battery Technology Workshop

Overview of Workshop

1 week

20 available spaces

English

September 2023
Monday 25th to Friday 29th

Campus Grimstad

Why batteries?

Lithium-ion batteries are key enablers for the green shift, allowing the storage of energy from renewable sources like wind or photovoltaics for later use. The industry in Sørlandet is orienting towards battery manufacturing, covering a broad range of the battery value chain from material and battery production to system design and recycling. It is a unique opportunity to utilize Norway's hydropower to establish the most sustainable battery value chain worldwide.

Who can participate?

This course is open for all battery enthusiasts. We will start from basics and dive into the details over the course of the workshop. A technical background will be advantageous.

UiA Videre – Battery Technology Workshop

Study Plan of Workshop

Monday

- Battery History
  - Setup of a lithium-ion battery
    - Laboratory

Tuesday

- Cell Designs
  - Degradation and side reactions
    - Laboratory

Wednesday

- Battery testing and data analysis
  - Safety aspects and mitigation
    - Exercise

Thursday

- Battery systems
  - Recycling of batteries
    - Safety training

Friday

- Ethics and sustainability of battery production
  - Test / Evaluation

What to you learn?

- have an understanding how energy is stored electrochemically in batteries
- knowledge about function of battery components
- overview of lithium-ion degradation mechanisms
- first experience in making a lithium-ion battery in a laboratory scale
- first experience in data analysis of battery experiments
- overview of battery system operation
- ability to explain key battery performance indicators and their physical origins
- knowledge about battery recycling routines and approaches
- ethical aspects of raw material mining for batteries
- understanding how batteries can be produced sustainably in Europe and Norway

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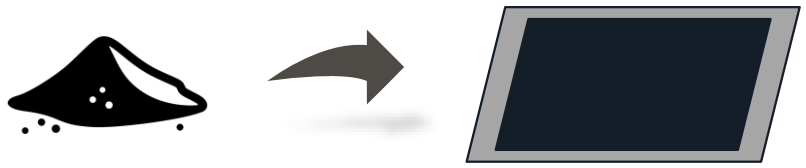
Study Plan of Workshop

Monday Tuesday Wednesday Thursday Friday

Curriculum

08:30	Welcome at UiA
09:00	Course – Electrochemistry and Batteries Introduction to electrochemical energy storage Typical types of batteries and their working principle
11:30	Lunch Break
12:15	Course - Lithium-Ion Batteries Working principle of lithium-ion batteries Lithium-ion batteries vs. aqueous batteries
14:00	Laboratory – Making electrodes
16:00	Social Event Cake and Discussion



“from material to electrode”

About the lecturer

Johannes Landesfeind works as an associate professor at the University of Agder and leads the Battery Coast strategy. His background is in physics, and he has experience from both academic and industrial research on lithium-ion batteries.

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Study Plan of Workshop

Monday | **Tuesday** | Wednesday | Thursday | Friday

Curriculum

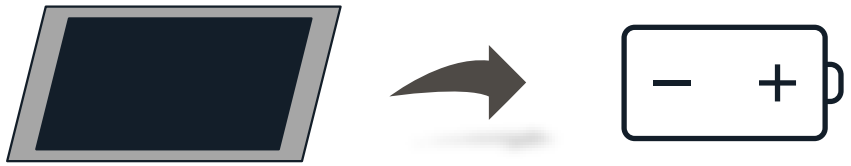
08:30 Course – Lithium-ion battery cells
- Manufacturing of lithium-ion batteries
- Different cell designs and their use-cases

10:00 Course – Degradation mechanisms
- Side reactions in lithium-ion batteries
- Capacity fade and resistance increase

11:30 Lunch Break

12:15 Laboratory – Making batteries
- Characterization of electrodes from prev. day
- Planning of battery design
- Assembly of battery cells

16:00 Social Event / Tapas and Drink Mixing Event with Battery Coast Industry and Academia



"from electrode to cell"

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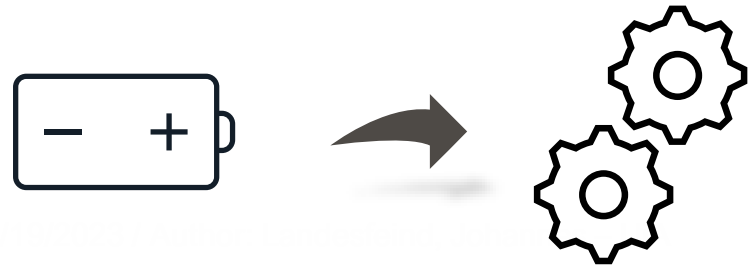
Monday Tuesday **Wednesday** Thursday Friday

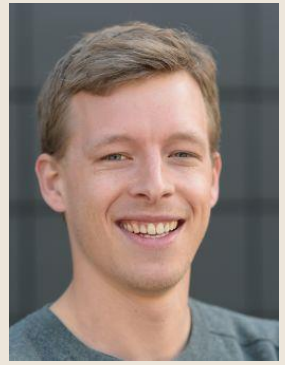
Curriculum

08:30	Course – Advanced Characterization Techniques Material characterization and link to battery aging Capacity fade and resistance increase
10:00	Laboratory – Data Analysis Analyzing the battery experiments Extraction of key performance indicators
11:30	Lunch Break
12:15	Course – Safety of Lithium-ion Batteries Hazards of battery components Dangers of handling lithium-ion batteries
14:30	Exercise – Extrapolate from Lab to Real Life
16:00	End



“from cell to operation”

About the lecturer



Gunstein Skomedal works at Vianode and has a 20% associate professor position at the University of Agder. His background is in material science. Since joining Vianode he has built up intensive knowledge about material production for lithium-ion batteries.

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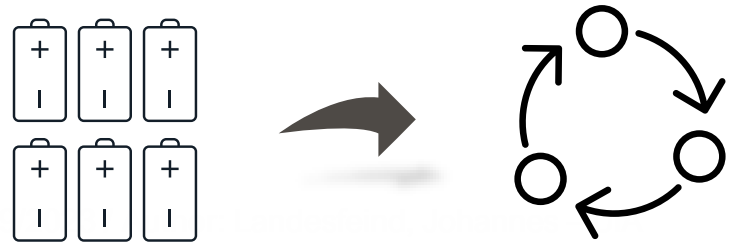
Monday | Tuesday | Wednesday | **Thursday** | Friday

Curriculum

08:30	Course – Battery Systems I
	Understanding the application Operation control and safety limits State of charge and state of health
10:00	Course – Battery Systems II
	Energy density on pack vs. material level Pack designs for different applications
11:30	Lunch Break
12:15	Demonstration – Lithium-ion battery fire
	with Grimstad fire brigade
14:00	Course – Battery Recycling
16:00	End



"battery systems and recycling"

About the lecturer

Bernhard Fäßler works as an application engineer at Stadler, manufacturing electric trains and has a 20% researcher position at the University of Agder. Martin Choux is an associate professor in the mechatronics section of the University of Agder and works on the automated recycling of batteries.

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Curriculum

08:30 Course – Sustainable Value Chains

Understanding circular battery value chains, life cycle analysis (LCA) and emissions from battery technologies.

11:30 Lunch Break

12:15 Course – Ethical and Social Aspects of Battery Production

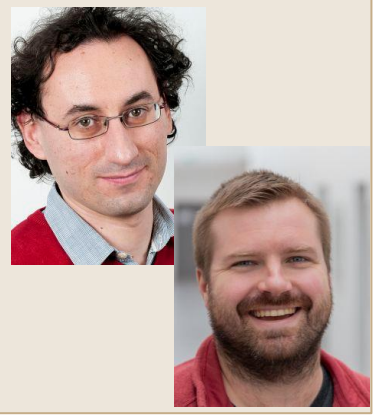
Raw material sourcing, global development and value chains. Geopolitics of batteries and EU policy responses.

15:00 Concluding Notes, Feedback

15:30 End

"Battery economy and ethics"

About the lecturers



Reyn O'Born works at the University of Agder and teaches on life cycle assessment. Vito Laterza is an associate professor at the University of Agder in the Department of Global Development and Planning.