

HIGH TEMPERATURE BATTERIES for Stationary Energy Storage

Workshop Program



The workshop is a collaboration between SINTEF and NTNU

Workshop in High Temperature Batteries for Stationary Energy Storage

Venue: Scandic Lerkendal, Klæbuveien 127, Trondheim

Monday September 18th 2017

19.00 Welcome reception in the Skybar at Scandic Lerkendal (the workshop hotel). A welcome drink and a light meal will be served.

Tuesday September 19th 2017

08.30 **Registration and Coffee**

Opening of workshop

09.00 **Jostein Mårdalen** Head of Department of Materials Science and Engineering, NTNU
Nina Dahl Vice President of Industrial Process Technology, SINTEF

Session 1: Battery Concepts

Session chair: Geir Martin Haarberg

09.10 **Donald Sadoway** MIT

Keynote: Innovation in Stationary Storage: the Liquid Metal Battery

09.55 **Hojong Kim** Pennsylvania State University

Thermodynamic Properties of Alkaline-earths (Ca, Ba, and Sr) in Liquid Metals (Bi and Sb) Determined by Electromotive Force (EMF) Technique

10.20 **Coffee break**

10.35 **Toshiyuki Nohira** Kyoto University

Intermediate Temperature Sodium-Ion Batteries Using Amide Ionic Liquids

11.05 **Jonas Pampel** Fraunhofer Institute for Material and Beam Technology

Development of Sodium-Sulfur Batteries Operating at Room Temperature

11.30 **Lunch**

Session 2: Battery Concepts continued

Session chair: Hojong Kim

12.30 **Geir Martin Haarberg** NTNU

A Liquid Sodium-Zinc and Molten Chloride Battery

12.55 **Camilla Sommerseth** SINTEF Materials and Chemistry

Title to be decided: Na-Zn battery

13.20 **Ann Mari Svensson** NTNU

Li-batteries, suitable for stationary energy storage?

13.45 **Coffee break and group photo**

Session 3: Fluid Dynamics

Session chair: Tom Weier/Douglas Kelley

14.15 **Douglas Kelley** University of Rochester

Transitions between Electromagnetic Flow States in Liquid Metal Batteries

14.35 **Valdis Bojarevics** University of Greenwich

Large Scale Liquid Metal Batteries

15.00 **Tom Weier** Helmholtz-Zentrum Dresden-Rossendorf

Electromagnetically Excited Flows and Instabilities in Liquid Metal Batteries

15.25 **Andrejs Tucs** University of Greenwich

Long Waves Instability Due to MHD Mode Coupling in Liquid Metal Batteries

18.00 **Dinner** at Kommandanten, Kristiansten festning (The historical fortress in Trondheim)



Wednesday September 20th 2017

Session 4: Battery Concepts

Session chair: Jonas Pampel

09.00 **Maria Broglia** RSE

A New Monocell for Na-beta High Temperature Batteries

09.25 **Meike Heinz** EMPA

Recent Advances in β'' -Alumina Ceramics for Na-Batteries

09.50 **Benjamin Schüßler** Fraunhofer Institute for Ceramic Technologies and Systems IKTS

Sodium Nickel Chloride Research Activities and Cathode Development

10.15 **Michael Schreieder** Younicos

Project TILOS – a Joint Effort for Future Energy Systems

10.25 **Coffee break**

Session 5: Policies, grid considerations and discussions

Session chair: Ole Kjos

10.55 **Discussion session 1**

How far are these battery technologies from being commercialised?

What are the main challenges with these technologies and how can they be solved?

11.25 **Brittney Becker** European Association for Storage of Energy (EASE)

EASE Presentation on RD&D Policy and Regulatory Frameworks to Support All Energy Storage Technologies

11.50 **Michael Belsnes** SINTEF Energy

The Role and Opportunity of Energy/Electricity Storage in the Future Electricity System

12.15 **Discussion session 2**

How to keep high temperature batteries/alternative concepts for stationary energy storage as a hot topic on the agenda? How to get support from companies? Scale-up.

12.45 **Wrap up of workshop**

13.00 **Lunch**

14.00-16.00 **Laboratory tour at NTNU/SINTEF facilities**

Thursday September 21st 2017

Trip to Hydro Aluminium AS, Sunndalsøra

07.45 Meet at lobby Scandic Lerkendal

08.00 Bus will leave Scandic Lerkendal. There will be snacks available on the bus.

11.00 Plant visit at Hydro Aluminium including lunch

14.00 Leave Hydro

17.00 Arrive Scandic Lerkendal