



The 24<sup>th</sup> International Conference on Advanced Batteries, Accumulators, Fuel Cells and Special Electrochemical Technologies

# Program of Lectures and Posters

ORGANISED BY BRNO UNIVERSITY OF TECHNOLOGY AND CO-SPONSORED BY

The International Society of Electrochemistry



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We would like to express our thanks to the Brno University of Technology, Faculty of Electrical Engineering and Communication for support and help with organising 24<sup>th</sup>ABAF conference

17:00 - 20:00Registration and Get-Together Party<br/>Transport from Hotel Continental at 17:00, 17:30, 18:00, 18:30, 19:00

# Monday, August 28<sup>th</sup>

8:00	<b>Registration</b> Transport from Hotel Continental to Conference Premises at 8:00
9:00	Opening of ABAF 24 <sup>th</sup>
	<i>Prof. RNDr. Vladimír Aubrecht, CSc.</i> Dean of Faculty of Electrical Engineering and Communication
	Assoc. Prof. Tomáš Kazda, Ph.D Organisation Committee
	Assoc. Prof. Ing. Marie Sedlaříková, CSc. Organisation Committee
	Ing. František Klein Organisation Committee
9:30	<i>Prof. T. Navrátil</i> International Society of Electrochemistry

# Lithium Systems

10:20

9:40 - 10:20	<i>S. Bodoardo</i> Battery2030+ initiative and smart functionalities: Sensors and Selfhealing materials for enhanced safety Lithium ion cells
	<i>L. Niedzicki</i> LiTDI and LiPDI Imidazole Salts for Li-ion Electrolytes – Thermal Stability and Water Scavenging Properties

**Coffee Break** 

10:30 – 11:50	<i>D. Versaci</i> LNMO/LFP blended cathode materials for lithium-ion batteries
	<i>M. Kasprzyk</i> Non-crystallizing electrolytes for lithium-ion batteries
	<i>M. Havlík Míka</i> Characterization of Li-ion batteries based on impedance spectroscopy
	<i>K. Fröhlich</i> BatWoMan: A superhero approach towards carbon neutrality in battery cell production in Europe
11:50	Time for Lunch
12:50 – 13:50	<b>B. Eschelmüller</b> SENSIBAT - Integrating Sensing Capabilities for State Estimation and Performance Assessment in Li-ion Pouch Cells
	<i>M. Sanad</i> Materials Science Strategies for Improving the Electrochemical Performance of Lithium-Ion Batteries
	<i>A. Straková Fedorková</i> Applied research on Li-ion and redox-flow batteries – sustainability and environmental impact
13:50	Coffee Break
14:00 – 14:40	<i>A. Visintin</i> New Active Materials for Lithium Batteries
	<b>K.B. Dermenci</b> Smart Functionalities Meet Batteries Under Battery 2030+: Embedding Self- Healing Binder in Advanced Li-Ion Batteries
14:40 - 16:10	Poster Section (+Best Poster of Young Scientists Competition)
16:10	Transport to Hotel Continental
16:40	Transport from Hotel Continental to Brno Exhibition Centre

#### 00 Brno Exhibition Centre Excursion



18:00

Restaurant Železná Růže Dinner and Social Evening



17:00

8:30 Transport from Hotel Continental to Conference Premises at 8:30

#### **Photovoltaic Systems**

#### 9:00 – 10:20 *L. Kavan* Interface Engineering in Energy Conversion and Storage Employing Oxide Semiconductors

*E. Shembel* Melanin-Organic Polymer with Semiconductor Properties as Unusual and Effective Material for the Energy Industry

#### **Fuel Cells**

#### G.A. Rimbu

R&D in Fuel Cells and Hydrogen Based Technologies @ ICPE-CA Bucharest

#### M. Carda

The Potential of In Operando Scanning Electron Microscopy for Solid State Chemistry at Elevated Temperature – The Densification of LSM:YSZ Composite

10:20 Coffee Break

#### **New Battery Systems**

10:30 – 11:50 **J.** Amici

Bio-renewable gel polymer membranes for sustainable Li-O<sub>2</sub> batteries

#### P. Mazur

Development of zinc-air flow battery

#### J. Červenka

High-Voltage Aqueous Dual-Ion Batteries Based on Water-In-Salt Electrolytes

#### *M. Zukalová* High-Entropy Additives Improving the Performance of Li-Sulfur Batteries

#### 11:50 **Time for Lunch**

#### 12:40 – 14:00 **Z.** Vlčková Živcová

In situ Monitoring of Battery Electrode Materials Changes using Raman Spectroelectrochemistry

#### L. Varain

Investigation of hydroxide formation and resulting degradation at the polymer-metal interface in advanced DS cells

#### H. Hoster

Self-activation and de-activation of oxide electrocatalysts: the interplay of time, potential, and dissolution kinetics

### **Applications and Simulations**

#### *M. Mačák* Numerical Simulation of Battery Storage Systems on Low Earth Orbits

- 14:00 Transport to Hotel Continental
- 14:30 Transport from Hotel Continental to Nuclear Power Plant Dukovany

# 15:30 *Nuclear Power Plant Dukovany* Excursion



17:30	<b>Restaurant Akciový Pivovar Dalešice</b> Dinner and Social Evening
20:30	Departure to Brno University of Technology – Tesla Coil Show
22:00	Departure from Brno University of Technology to Hotel Continental

8:30	Transport from Hotel Continental to Conference Premises at 8:30
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# **Applications and Simulations**

#### 9:00 – 10:00 *J. SedImeier* Renishaw - Raman spectroscopy for lithium-ion battery research

*M. Biebl* Model-based optimization of electrolyte filling using laser structured electrodes

# **Lithium-ion Battery Applications**

*A. Gigl* Innovate, Collaborate, Regulate: Navigating Through Lithium-ion Battery Transport Regulations

10:00	Coffe Break
10:10 – 11:10	<i>K. Jaššo</i> The ecology of electric vehicles and the European Union's current approach
	<i>M. Macko</i> BUT Formula Student - joining academic exercise and motorsport
	<i>J. Kašpárek</i> EV Battery – Battery production in ČR
11:10	Coffe Break
11:20 - 12:40	<i>M. Zezůlková</i> Lithium Mining Project in Czech Republic
	<i>J. Reiter</i> Development and Protyping of High-Energy and High-Power pouch cell
	<i>J. Košť álová</i> Presentation of EVC Group activities
	<i>V. Blumtritt</i> Battery Recycling at Kovohutě Příbram

#### 12:40 Time for lunch

# 13:40 - 15:10University Laboratories Excursion - Department of Electrical and<br/>Electronic Technology, FEEC, Brno University of Technology



- 15:10 Transport to Hotel Continental
- 16:40 Departure from Hotel Continental to Restaurant
- 17:00Restaurant L'EAU VIVE<br/>Dinner and Closing Ceremony



# **List of Posters**

# **Lithium Batteries and Related Systems**

**J. Amici**: Interface Engineering in Energy Conversion and Storage Employing Oxide Semiconductors

R. Apostolova: The analysis of the conversion of thin-layer SiO<sub>2</sub> in the redox reaction with lithium

J. Báňa: Effect of pressing pressure on the capacity of recycled graphite anode

M. Ceylan: Experimental Investigation of Open Circuit Voltage for Lithium-ion Batteries

M. Fridrich: Lithium-Ion (LCO/NMC, NMC, LFP) Battery Recycling: LCA Study

**N. Globa:** LiFe<sub>0.05</sub>Mn<sub>1.95</sub>O<sub>4</sub> as a high-rate cathode material for lithium-ion batteries

**H. Hálová:** Spray-drying Synthesis of Perspective Materials for Cathodes of Li-ion Batteries with Low Cobalt Content

**M. Kasprzyk:** Electrochemical study comparing liquid and gel electrolytes for lithium-ion batteries based on LiTDI and  $LiPF_6$ 

O. Klvač: Analysis of Degradation Mechanisms in Prismatic Li-ion cell

O. Korzhenko: Analysis of traditional and alternative Lithium-ion batteries recycling methods

S. Madani: Aging in lithium-ion batteries: A mini-review

**K. Nováková:** Review of Electrochemical Impedance Spectroscopy Methods for Lithium-ion Battery Diagnostics and Their Limitations

**M. G. Ortiz:** Effect of Synthesis Methods on Graphene Nanofibers-Sulfur Composite as Cathode Material for Li-S Batteries

**Y. Pustovalov:** Synthesized Innovative Graphite with Nanostructure and Unique Properties Increases Energy and Power of Lithium Batteries

K. Rogala: TDI-based ionic liquid as a plasticizer in PVdF-HFP membranes

**E. Shembel:** Synthesized Innovative Graphite with Nanostructure and Unique Properties Increases Energy and Power of Lithium Batteries

M. Šedina: Testing batteries under external force

**A. Šimek:** Electrochemical methods to detect water-contaminated electrolytes for lithium-ion batteries

# **Supercapacitors**

B. Mladenova: Application of "green" manganese dioxide in solid-state supercapacitors

**L. Soserov:** Comparative study of electrochemical performance of symmetric supercapacitors with aqueous electrolyte and with polymer exchange membrane

# **Fuel Cells**

D. Budáč: Development of Structured Electrodes for Solid Oxide Electrolysis Cells

**E. M. Lungulescu:** High-performance materials processed by gamma irradiation for special applications – membranes, catalysts and electrodes

**V. Nefedov:** Hydrogen production with reduced energy consumption for use in fuell cells and energy sector

**N.O. Nicula:** Microbial fuel cells technology for bio-remediation and electrical energy harvesting from organic solid waste in wastewaters

M. Paidar: Portable Power Source Based on PEM Fuel Cell

# **Aqueous Batteries**

P. Křivík: Temperature Changes in a Lead-Acid Battery During Cooling

# **New Systems of Batteries**

O. Čech: Inversely Vulcanized Sulfur as Electroactive Material for Li-S Cathodes

- J. Libich: Sodium-ion batteries: research of carbon based negative electrode materials
- V. Procházka: Characterisation of precursor suspensions for fibrous electrodes
- A. Šimek: Anthracite as anode material for sodium-ion batteries

# **Photovoltaics**

**R. Bayer:** Tilt angle adjustment for solar panels mounted on solar ships to optimize the charging cycle of connected batteries

J. Fabián: Modular PV System Design and Evaluation

K. Jandová: Design and Optimization of Solar-Powered Irrigation System

**E. Shembel:** Nano-Structured Innovative Transparent Polymers Replace the Glass and Increase the Energy of PV Modules

**V. Smilyk:** Comparative Photoelectrochemical Characteristics Of Heterostructure And Composite Based On BiVO<sub>4</sub> And WO<sub>3</sub>

# **Corrosion, Applications and Simulations**

J. Kuchařík: Corrosion Processes of Sintered Materials Based on Fe

S. Madani: Thermal Safety of Lithium-ion Batteries: a mini-review

S. Madani: Thermal Modeling of Lithium-ion Batteries: a mini-review

M. Sedlařík: Thermal modeling of lithium-ion battery packs

E. Shembel: In-situ characterization of an electrochemical cell prepared in SEM

J. Martiš: Battery Powered City-Bike Light with an Optimized Step-up Converter

J. Maxa: Evaluation of Ballistic Coefficient for .223 rem Projectiles

**J. Maxa:** Mathematical and Physical Analysis of Waste Heat Dissipation During Compression of Air Used as Energy Storage

M. Sedlaříková: Corrosion Processes of Sintered Materials Based on Fe

**E. Shembel:** Non-Destructive Non-Contact Testing for Investigation of Initial Materials and During Production of Li Batteries, Solar Cells, a

P. Šabacká: Mathematical and Physical Analysis of Thermal Conductivity at Low Pressures

P. Šafl: Degradation processes of polymeric materials

M. Sedlaříková: Gel Polymer Electrolytes in Liquid Ionic - One Way of Increase Conductivity

P. Vyroubal: Simple overview of using digital twin in energy storages

# NOTES