23rd ABAF
BRNO 2022
Advanced Batteries, Accumulators and Fuel Cells

FACULTY OF ELECTRICAL ENGINEERING AND COMMUNICATION
department of electrical and electronic technology

The 23rd 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

European Energy Research Alliance

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ISE 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 23rd ABAF conference

Sunday, August 21st

17:00 – 20:00 **Registration and Get-Together Party**
Transport from Hotel Continental at 17:00, 17:30, 18:00, 18:30, 19:00

Monday, August 22nd

8:00 **Registration**
Transport from Hotel Continental to Conference Premises at 8:00
(8:45 for Those Registered on Sunday)

9:30 **Opening of ABAF 23rd**

Prof. RNDr. Vladimír Aubrecht, CSc.
Dean of Faculty of Electrical Engineering and Communication

Assoc. Prof. Ing. Marie Sedlaříková, CSc.
Organization Committee

Assoc. Prof. Tomáš Kazda, Ph.D
Organization Committee

Ing. František Klein
Organization Committee

Prof. Kristina Edström
Battery 2030+

10:00 ***L. Chladil***
Involvement of Brno University of Technology in EERA & Research Activities on Post-Lithium Chemistries

J. Schwarz
EU Supported Initiatives on Batteries

10:20 **Coffee Break**

Supercapacitors

10:30 – 11:30 ***G. Lota***
Capacitor Lifetime Prolonged by Addition of Organic Ammonium Salt

J. Wojciechowski
Electrochemical Capacitor with Variable Polarization

Lithium Systems

J. Amici
Polymer in Ceramic Approach towards Safer Electrolytes for Lithium Metal Cells

11:30 **Coffee Break**

11:40 – 12:40 ***M. Kasprzyk***
Influence of Anion Shape on Non-crystallizing Region of an Electrolyte

D. Versaci
Ultrasmall SnO_2 Directly Grown on Commercial Carbon Black: a Versatile Composite Material for Li-Based Energy Storage

L. Niedzicki
Solid Hybrid Polymer Electrolyte for All-Solid-State Li-ion Battery Based on Novel Salts

12:40 **Time for Lunch**

13:40 – 14:40 ***M. Zukalová***
Engineering of the Composite Cathode for Li-sulfur Battery

R. Dominko
Electrochemical Sensor Enabling Detection of Dissolved Cations in Electrolyte

Flow Batteries

P. Mazúr
Organic Redox Compounds for Cheaper and Greener Flow Batteries - a Critical View

14:40 **Coffee Break**

Lead Acid Batteries

14:50 – 15:30 ***P. Kedzior***
New Starter Lead-acid Battery with Modified Electrolyte by Ionic Liquid

R. Plowens
Impact of the Carbon Additives for the Performance of the Lead-acid Battery

15:30	**Coffee Break**
15:40 – 17:00	**Poster Section** (+Best Poster of Young Scientists Competition)
17:00	Transport to Hotel Continental
17:40	Departure from Hotel Continental to Restaurant
18:00	**Restaurant Baroko** (Orlí 469/17) Dinner and Social Evening

Tuesday, August 23th

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

Photovoltaic Systems

9:00 – 10:00 ***E. Shembel***
Unconventional Hybrid Systems based on Innovative PV Modules and Electrochemical Batteries will Provide High Energy Creator and Storage

Fuel Cells

M. Paidar
Renewable Hydrogen Sources for Fuel Cell Powered Trains in Czech Republic

Lithium-ion Batteries

A. Visintin
Li Batteries in South America

10:00 **Coffe Break**

Battery 2030+

10:10 – 10:30 ***T. Kazda, K. Edström, R. Dominko, M. Nasir***
Introduction
Towards the Invention of Sustainable Batteries of the Future
Battery 2030+ Visions and the Purpose of this Meeting

10:30 – 11:30 Short Presentations on Ongoing Battery Initiatives in CEE Countries

I. S. Rubenstein
Czech Republic

R. Kun
Hungary

G. Lota
Poland

G. Rimbu
Romania

11:30 – 12:00	Needs and Possibilities of Collaboration and Support at the European Level Panel Discussion Moderated by ***R. Dominko***
12:00 – 12:15	Next Steps / Action Plan
12:15	**Time for Lunch**

Simulation, Analysis

13:00 – 13:40	***M. Mačák*** Numerical Simulation of Cathode Structure Influence on Lithium-Battery Behaviour ***L. Varain*** Electrochemical Investigation and Modeling of Ion- and Water Transport Through Polymer Membranes
13:40	Transport to Hotel Continental
14:30	**Battle of the Three Emperors Memorial + Slavkov Castle** Excursion and Dinner Departure from Hotel Continental 14:30

Wednesday, August 24th

8:30 Transport from Hotel Continental to Conference Premises

Lithium Systems

9:00 – 10:00

D. Capková
Metal-Organic Frameworks as Suitable Matrices for Sulfur in Next-Generation

L.S. Shankar
Supercritical Carbon Dioxide Assisted Synthesis of Ultra-stable Sulfur/carbon Composite Cathodes for Li-S Batteries

Lithium-ion Battery Applications

O. Klvač
Batteries in SEM: in Situ Battery Materials Synthesis and Electrical Testing

10:00 **Coffee Break**

10:10 – 11:10

J. Appell
Electrochemical Impedance Spectroscopy and Quality Indicators

I. Okrabec
Recycling of Lithium Batteries in Kovohutě Příbram

J. Reiter
InoBat: Battery Manufacturer for EV - Current Status of R&D

11:10 **Coffee Break**

11:20 – 12:40

J. Vejbor
EVC Group: Lithium Battery Integration Business in Wake of Worldwide Electrification

P. Pečený
Digital Twin as a Gateway to the Virtual Heaven Ansys Twin Builder as a Key

A. Kolouchová
Pragolab: Characterization of Materials for Conversion and Energy Storage

J. Kašpárek
EV Battery: Production of Li-ion Batteries in the Czech Republic

	J. Marušinec ASEP: Electromobility in the Czech Republic
12:40	**Time for Lunch**
13:20 – 14:20	**Poster Section** (+Best Poster of Young Scientists Competition)
14:20	**Coffee Break**
14:30 – 16:00	**University Laboratories Excursion -** Department of Electrical and Electronic Technology, FEEC, Brno University of Technology
16:00	Transport to Hotel Continental
16:40	Departure from Hotel Continental to Restaurant
17:00	**Restaurant L'EAU VIVE** (Petrov 274/2) Dinner and Closing Ceremony

List of Posters

Lithium Batteries and Related Systems

R. D. Apostolova: Electrochemical Behavior of SiO_2 - Containing Electrodes in Lithium Battery Systems: Effect of the SiO_2 Production Methods

M. Broszkiewicz: Electrochemical Characterization of LiPCP and its Performance with Different Electrodes

D. Csik: High Entropy Spinel Oxide with Excellent Cycle Stability

P. Guricová: The Study of NMC Cathodes Regenerated with Relithiation Process

J. Kočí: The Mullite Nanofibers for Electrotechnical Applications

J. Kříž: An All-organic Battery based on Poly(9-vinylcarbazole) Cathode

C. Limachi: Designing Batteries For Recycling: Fluorine-Free Lithium-Ion Batteries

J. Máca: Influence of Negative Temperature on Negative Electrode

S. Madani: A Comprehensive Heat Generation Study of Lithium Titanate Oxide-based Lithium-ion Batteries

I. Maksyuta: Melanin as Biological Organic Polymer with Semiconductor Properties is Unique Effective Modifier for MnO_2 Cathode and Increases the Energy of Li-MnO_2 Battery

M. G. Ortiz: Anodes for Li-ion Batteries Based on Electrodeposited Tin in Deep Eutectic Solvents

M. G. Ortiz: Electrochemical Performance of $Li_{1.2}Ni_{0.2}Mn_{0.6}O_2$ Disordered Rock-Salt Cathode Material

M. G. Ortiz: Synthesis and Characterization of $LiMn_2O_4$/$LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ Structures as Cathode for Li-ion Batteries

A. Pražanová: Lithium-Ion Battery Module-to-Cell: Disassembly and Material Analysis

E. Shembel: Nanostructured Innovative Carbon-Based Materials Modify Electrodes and Dramatically Improve the Efficiency of Thin, Flexible Lithium Batteries

Y. Shmatok: Cobalt and Nickel Titanates as Effective Anode Materials for Lithium-Ion and Sodium-Ion Batteries

T. Syrový: Electrolytes Modified with Boron-Based Additives for High-Voltage Batteries

M. Šedina: How Can Pressure Help in EV

Z. Štubianová: Multiscale 3D Analysis of Flat Lithium-Ion Batteries by X-ray Computed Tomography

D. Zalka: Ag_2S as an Alternative Electrode Material for Li-ion Batteries

Supercapacitors

L. Soserov: Hybrid Supercapacitors Based Of Mno_2 - Carbon Xerogels Operating In Aqueous Electrolyte

Fuel Cells

D. Budáč: Numerical Prediction of Electrical Conductivity of Porous Composite Materials: LSM-YSZ Case Study

M.O. Danilov: Hybrid Composite Based on g C3N4 with PUMWCNTs - Promising Electrode Material for the Oxygen Electrode of Fuel Cells

S.V. Chivikov: Reversible Photoelectrochemical Cell Produced by Using 3D Print for the Accumulation "Solar" Hydrogen

Aqueous Batteries

L. Chladil: The Effect of Additives Suppressing Dendritic Growth on the Recrystallization of ZnO Particles in the Alkaline Environment of Batteries

J. Smejkal: Influence of Different Cycling Speed on the Life-span of the Negative Electrode for Lead-acid Batteries

New Systems of Batteries

C. A. Calderón: Gel Polymer Electrolyte With Nanoparticles And 2D Materials As Fillers For Lithium Sulfur Batteries

P. Čudek: Preparation and Analysis of Carbon Derived from Biological Materials for Use in Li-S Batteries

N. I. Globa: Effect of Structure and Morphology of Titanium Dioxide on Electrochemical Characteristics of Lithium-Sulfur Batteries

O. V. Markevych: Comparison of the Diffusion Coefficient of Li-Ions by Methods of PITT and Network Thermodynamics for Fe-Sulfides of Li-Battery

V. Niščáková: Sulfur/Polypyrrole Cathode Material for Lithium Sulfur Battery

M. G. Ortiz: Different Carbon Processes for Lithium-Sulfur Batteries

K. Pershina: Impact of the Graphene Synthesis on Electrochemical Properties of Graphene - Graphite Systems

Y. Polishchuk: Graphene-Modified Sulfur Cathode Ensuring High Stability of Li-S Batteries Parameters

V. Procházka: Characterization of Precursor Sols for Preparation of Silica Based Nanofibers

K. M. Rogala: Synthesis of a New Fluorine-free Ionic Liquids Containing an Anion PCP- to Use in Solid State Batteries

M. Zajcev: Development of Oxygen Reduction and Oxygen Evolution Electrodes for Alkaline Zinc-air Flow Battery

Photovoltaics

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

K. Mairhofer: Photoelectrochemical Method for the Investigation of Wide-Bandgap Semiconductors

J. Vaněk: Comparison of Modeling Tools of the Photovoltaic Power Plants

Corrosion, Applications and Simulations

R. Cipín: Physics Informed Neural Network and RC Model of Li-Ion Battery

L. Dobšáková: Cooling Ability of Smooth and Dimpled Surface

L. Horák: Environmentally Friendly Epoxy Resin

P. Houška: The Potential of Brownfields as a Suitable Locations for Solar Panel Instalation Based on Global Radiation Measurements

O. Klvač: 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. Mikolášek: Analysis of Li-ion Battery Degradation Mechanism by EIS, GITT and ICA and their Possible Utilization for SOH Monitoring

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

E. Shembel: Innovative Non-Destructive Non-Contact Methods Testing to Solve for the Bridge the Gap between Materials Limitation and Manufacturing. Answering the Requirements of High Energy

M. Tkach: Mobile System for Power Sources Monitoring and Diagnostics based on INA 219 Module

J. Viliš: Evaluation of Ballistic Resistance of Thermoplastic and Thermoset Composite Panels

P. Vorel: Battery Powered City-Bike Light with an Optimized Step-up Converter

P. Vyroubal: Numerical Modeling of Li-Ion Battery Gassing

J. Zimáková: Failure Mechanism in The Pearlite Structure

J. Zimáková: Evaluation of Cold Kinetic Deposition Technology

J. Zimáková: Evaluation of The Use of Non-destructive Methods of Acoustic Emission on Materials

NOTES