22nd ABAF
BRNO 2021
Advanced Batteries, Accumulators and Fuel Cells

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

The 22nd 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

The Electrochemical Society

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Sunday, August 22nd

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 23rd

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 22nd**

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

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

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

Ing. František Klein
Organisation Committee

10:00 *Assoc. Prof. Miroslav Fojta*
International Society of Electrochemistry
A Look at the Present with Our Vision for the Future

Prof. RNDr. Petr Vanýsek, CSc.
Involvement of BUT in EERA & Research Activities on Post-Lithium Chemistries

10:20 **Coffee Break**

New Systems of Batteries*

* Seminar "New Systems of Batteries" is supported by project EERA-CZ 2 (LTI 19002)

10:30 – 11:30 *R. Dominko*
Organic Multivalent Batteries

L. Kavan
Titania Containing Cathodes for Lithium-Sulfur Batteries: Case Studies by Electrochemical Impedance Spectroscopy

A. Straková-Fedorková
New Composite Cathode Materials for Li-ion and Li-S Batteries

11:30 **Time for Lunch**

12:30 – 13:30 *T. Kazda*
Materials for Na-ion and Li-S Batteries

M. Zukalová
Influence of Carbonaceous and Inorganic Additives on Electrochemical Performance of Sulfur-Composite Cathode for Lithium-Sulfur Batteries

T. Syrový
Printed Electrode for Sodium-Ion Batteries Based on Organic Compounds

13:30 **Coffee Break**

Aqueous Batteries

13:40 – 14:40 *P. Mazúr*
Pyridinium based Anolytes for Redox Flow Battery

J. Mrlík
Study of Deactivation of Vanadium Redox Flow Battery Negative Graphite Felt Electrode in Single Electrolyte Set Up

Z. A. Zafar
Perchlorate Based "Water in Salt" Electrolyte for Beyond Lithium-Ion Electrochemical Energy Storage Systems

14:40 **Coffee Break**

14:50 – 15:50 *G. Abbas*
Electrochemical Intercalation of Anion into Graphite Using Concentrated Aqueous Electrolytes

P. Vanýsek
Visualizing Impedance Spectroscopy Response for Interpretation of Collected Data

Photovoltaics

P. Vanýsek
Perovskite Single Crystals for Energy Conversion of Solar Radiation

15:50 **Coffee Break**

16:00 – 17:00 **Poster Section** (+Best Poster of Young Scientists Competition)

Transport to Hotel Continental at 17:00

17:40 Departure from Hotel Continental to Restaurant

18:00 **Restaurant L'EAU VIVE** (Petrov 274/2)
Dinner and Social Evening

Tuesday, August 24th

Transport from Hotel Continental to Conference Premises at 8:30

Supercapacitors

9:00 – 10:00 *G. Lota*
Long-Term Performance of Electrochemical Capacitors

Fuel Cells

M. Paidar
Potential of Hydrogen Powered Trains in Czech Republic

K. Mairhofer
Photoassisted Electrodeposition of Cuprous Oxide Thin Films

10:00 **Coffee Break**

Lithium-ion Batteries

10:10 – 11:10 *L. Niedzicki*
Non-Fluorine Salts for Safer and Less Hazardous Li-Ion Batteries

M. Kasprzyk
The Study of Lithium PVdF – HFP Electrolytes Based on Non-Crystallizing Solutions

M. Broskiewicz
Imidazole-Based Lithium Salt as an Additive for Lithium Conducting Electrolytes

11:10 **Coffee Break**

11:20 – 12:20 *L. Neidhart*
Critical Parameter Evaluation of Thick, Multi-Layer Cathodes in Li-Ion Batteries

B. Eschelmüller
Laser Structuring of NMC 811 High Energy Electrodes in Battery Production for Enhancing the Electrochemical Performance for xEV Energy Storage Systems

V. Knap
Calendar Degradation and Self-Discharge Occurring during Short- and Long-Term Storage of NMC Based Lithium-ion Batteries

12:20 **Time for Lunch**

Simulation, Analysis, Application

13:00 – 14:00 *M. Mačák*
Numerical Simulation of Cathode Structure Influence on Lithium-Sulphur Battery Behaviour

A. Maxová
Mathematical and Physical Analysis of the Effect of Conical and Detached Shock Waves at the Tip of a Static Probe in an Experimental Chamber

P. Šabacká
Mathematical-physical Analysis of Drag Force of a .223 REM Caliber Projectile

Transport to Hotel Continental at 14:00
("Brno Group" Departure to Moravsky Krumlov at 14:00)

16:00 **Alphonse Mucha: "THE SLAV EPIC", Moravský Krumlov**
Excursion to Gallery and Dinner
Departure from Hotel Continental at 14:45

Wednesday, August 25th

Transport from Hotel Continental to Conference Premises at 8:30

Simulation, Analysis, Application

9:00 – 10:00 *K. Fröhlich*
Process Standardisation of EU Research Pilot Lines for Prototype Cell Production

P. Blažek
Multiscale 3D Analysis of Defects and Temporal Development of Electrode Morphology in Lithium-ion Batteries by X-ray Computed Tomography

R. Faitl
TechSoft Engineering: Battery Crash Simulations

10:00	**Coffee Break**
10:10 – 11:10	*R. Perdikis* ECOBAT: The Safety Challenge of Portable / Vehicle and Industrial Battery *Z. Kunický* Kovohutě Příbram: Lithium Batteries Recycling Project *J. Vejbor* EVC Group: Lithium Battery Integration Business in Wake of Worldwide Electrification
11:10	**Coffee Break**
11:20 – 12:20	*P. Čmelík* ČEZ: The Battery Value Chain as a Strategic Priority for ČEZ *J. Kašpárek* EV Battery: Production of Li-ion Batteries in the Czech Republic *J. Marušinec* ASEP: Electromobility in the Czech Republic
12:20	**Time for Lunch**
13:20 – 14:20	**Poster Section** (+Best Poster of Young Scientists Competition)1
14:20	**Coffee Break**
14:30 – 16:00	**University Laboratories Excursion –** Department of Electrical and Electronic Technology, FEEC, Brno University of Technology Transport to Hotel Continental at 16:00
16:40	Departure from Hotel Continental to Restaurant

17:00 **Restaurant Baroko** (Orlí 469/17)
Dinner and Closing Ceremony

List of Posters

Lithium Batteries and Related Systems

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

D. Capková: Pyrite as a Low-Cost Additive in Sulfur Cathode Material for Stable Cycle Performance

O. Čech: Amorphous Sulfur Copolymer for Li-S Batteries Prepared by Inverse Vulcanization

D. Csik: Spinel Structured High Entropy Oxide $(CoFeCrNiAl)_3O_4$ as Anode Active Material in Lithium-ion Batteries

S. Dubinevych: Graphene's Correlation of Electrical and Magnetic Properties Manages the Modification and Increasing the Energy of Li Batteries

M. Fibek: Lithium-Titanate as Electrode Material for Aprotic Systems

P. Guricová: The Study of Cathode Material Stability after Disassembly of Li-ion Cell

K. Jaššo: Determining the Optimal Height of the Active Layer for the Positive Electrode of Lithium-Sulfur Batteries

O. Klvač: Preparation of an Electrochemical Cell Inside a Scanning Electron Microscope

W. Kurpiel: Research on Lithium-Iron-Phosphate Cells (LiFePO4) in Terms of Temperature Hazard during Operation

J. Libich: Rate Capability Testing of Graphite Electrode Material

T.V. Lisnycha: Surface Characteristics of TiO_2 and their Effect on Specific Capacity in Lithium and Sodium Systems

J. Máca: Deposited Layers as Negative Electrodes

M. Motiei: Hollow Structure of MnO_2 Wrapped Sulfur Microsphere to Suppress the Volume Changes in Lithium-Sulfur Battery

O. Ovchinnikova: Non-Aqueous Ionic Liquids Based on Quaternary Ammonium Salts for Lithium-Sulfur Batteries

S. Peterová: Comparison of Gel Polymer Electrolytes Containing Lithium and Sodium Salts

Y. Polishchuk: Melanin’s Semiconductor Nature and his Polymer Structure Successfully Modifies Sulfur Cathode and Increase Efficiency on Li-S Batteries

A.V. Potapenko: EIS Analysis of Sulfur Cathodes with Water-Soluble Binder NV-1A for Lithium-Sulfur Batteries

A. Pražanová: Electrical Circuit Model of Lithium-ion Batteries and Revisiting of its Parametrization Procedures

K. Rogala: New Ionic Liquid for Lithium-Ion Batteries

E. Shembel: Generating Innovative Solid Polymer Electrolyte Based on Melanin and Without Binder for High Energy Li Batteries

M. Šedina: LIBs with Anode Subside by Silicon and their Reaction on Pressure

J. Taňska: Solid-State Electrolytes Based on New Polymer DAIKIN® Fluoropolymer for Li-ion Batteries

A.K. Thakur: A Critical Review of Recent Development of Novel Li-ion Battery Cooling Methods using Phase Change Materials for Fast Charging Application

J. Veselkova: Study of Gel Polymer Electrolytes for Li-S batteries

D. Zalka: A New High Entropy Sulfide Material for Lithium Ion Battery Anodes

A. Zsigmond: The Effect of Electrode Binders to Electrochemical Properties of Negative Electrode Materials

Fuel Cells

M. Carda: Preparation and Properties of YSZ Ceramic Electrolyte for Solid Oxide Cells

Aqueous Batteries

M. Kamenskii: The Electrochemical Performance of δ-MnO_2 Cathode Material for Aqueous Zinc-Ion Batteries: the Role of Current Collector

P. Kedzior: Ionic Liquids as Additive Modifying Electrolyte of Lead-Acid Battery

R. Plowens: Carbon Additives Effect on Lead-Acid Battery Properties

J. Smejkal: Study of Surface Processes Taking Place on the Surface of the Negative Electrode of Lead-acid Batteries Using XRD

A.I. Volkov: Electrochemically Deposited Binder-Free MnO2 Cathode for Aqueous Zinc-Ion Batteries

J. Zimáková: Monitoring the Influence of the Temperature on the Properties of Lead-acid Battery

Supercapacitors

H. Fei: Carbon Coating on Nb_2O_5 for High-Rate Anode for Li-ion Capacitors

New Types of Batteries

N.I. Globa: Ion-Exchange Reaction in Li-Na Systems as an Effective Method for the Synthesis of Sodium-ion Battery Electrode Materials

T. Kutsch: Influence of Carbonization Temperature on Morphology and Oxygen Reduction Activity of Electrospun Ni/NiO-decorated Carbon Fibre Mats as Self-Standing Cathodes for Metal–Air Batteries

P. Richtr: Development Oxygen Evolution Electrode for Alkaline Zinc-Air Flow Battery

Y. V. Shmatok: Structure, Morphology and Electrochemical Characteristics of Na_xMnO_2 (x = 0.44, 0.67 and 0.8) as Cathode Materials for Na-ion Batteries

Photovoltaics

K. Jandová: Solar-Powered Irrigation System

P. Křivík: Impedance Measurements of AGM Solar Battery for RAPS Systems

F. Langer: The Influence of Environmental Conditions of the Recycling of Solar Modules

Corrosion, Applications and Simulations

Simulation

R. Bayer: Mathematical and Physical Analysis of Pressure Gradient in the Experimental Chamber for Subsequent Comparison with Optical Methods

R. Cipín: Using Neural Network for Estimation of Li-ion Battery Depth of Discharge

M. Mačák: Equivalent Circuit Modelling of Li-S Batteries

M. Mačák: Modelling of Electrochemical Magnetohydrodynamics in Ansys Fluent

P. Vyroubal: CFD Simulation of Thermal Abuse in Lithium-Ion Battery Pack

P. Vyroubal: Numerical Modeling of Reactions at the Level of an Electrochemical Cell

J. Zimáková: A Tool for Effective Management of the Logistics Process with a Direct Link to the Material Life Cycle

Materials, Corrosion

T. Binar: Evaluation of the Use of Cold Kinetic Deposition Technology on Materials Used in Electrical Engineering

T. Binar: Example of Application of Cold Spray Technology in Electrical Engineering

T. Binar: Impacts of Simulated Climate Change on Vehicle Engine Function Parts

T. Binar: Use of Cold Kinetic Deposition Technology on Materials Used in Electrical Engineering

D. Dobrocky: Influence of Machining Parameters on the Surface Quality of Technical Plastics

J. Dokoupil: Effect of Temperature Cycling on IMC Growth and Solder Joint Strength of SAC305 Solder Alloy and REL61 Low Silver Alloy

L. Horák Ecological Epoxy Casting Systems for Electrical Engineering Applications

V. Horák: Thermodynamics of Moist Air for Vacuum Technology

D. Kusmič: The Corrosion Resistance of Anodized EN AW 7075 T6 Alloy

H. Ch. Nguyen: Effects of Hybrid Surface Treatment Composed of Plasma Nitriding and CRN Coating on Friction-Wear Properties and Adhesion Strength of Stainless Steel

H. Polsterová: Dielectric Properties of Nanocomposites Based on Epoxy Resin

J. Procházka: Modification of Surface Structure by Diffusion Processes

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

M. Sedlaříková: Corrosion of Sintered Materials Based on Fe.Si-Ag-Mg

Z. Studený: Resistance of PLA Material Prepared by Additive Technology

P. Šafl: Observation of Environmental Impact on HIPS Material for 3D Printing

Application

T. Binar: Use of Photovoltaic Panels to Power Variable Traffic Signs

T. Binar: Power Supplies for Variable Traffic Signs

R. Kutil: Analysis of Time Delays in the Supply of Rechargeable Batteries in a Specific Inventory System

P. Maule: Measuring the Electrical Capacity of Lithium Batteries and Implementing the Values in the Warranty Conditions of BEV and PHEV Battery Manufacturers

P. N. Nam: Battery Monitoring System Using Microcontroller ESP32 and Internet of Things

V. Síťař: Impact of Electric Vehicles Charging on Electric Distribution Grids in Small Villages

P. Vorel: Battery Powered Lawn Mower

J. Zimáková: A Tool for Effective Management of the Logistics Process with a Direct Link to the Material Life Cycle

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