



First International Zn/Air Battery Workshop 1st IZABW

April 5th – 7th, 2016
Ulm, Germany

Organized by:

Federal Ministry of Education and Research (BMBF) –
Project “Zinc/Air Battery with Advanced Materials for Storage of
Renewable Energies and Grid Balancing” (LUZI)



Federal Ministry
of Education
and Research

Background

During the last years significant efforts have been made to develop post Li-ion technologies. In the course of these efforts the “old” Zn/air battery came into focus due to its many advantages such as for example high specific energy, low cost, good safety record etc. However, mainly caused by the drawback of low cycle life, electrically rechargeable Zn/air batteries have not found their market yet.

In order to support the further development of the Zinc/air system by determination the international state-of-the-art, discussing promising R&D pathways for the technical improvement and by initiating international co-operations we will organize an international workshop. This

First International Zinc/Air Battery Workshop (1st IZABW)

The workshop is organized in the framework of the BMBF project “Zinc/Air Battery with Advanced Materials for Storage of Renewable Energies and Grid Balancing” (LUZI). The LUZI project will run until middle 2018 and it is planned to have the 2nd IZABW in spring 2018.

Thanks to the help of the German Federal Ministry of Education and Research (BMBF) we are can offer no registration fees.



We thank also VARTA Microbattery, Ellwangen (Germany) for their financial workshop support.



Organizers

Content:

BMBF-Project “Zinc/Air Battery with Advanced Materials for Storage of Renewable Energies and Grid Balancing”

Administration:

Weiterbildungszentrum für innovative Energietechnologien der Handwerkskammer Ulm (WBZU)



Contact persons

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Transportation

Most visitors to Ulm fly to Stuttgart International Airport, approximately 90 km to Ulm.

Other possibilities are:

- Frankfurt International Airport, approximately 280 km to Ulm
- Munich International Airport, approximately 170 km to Ulm

At all airports trains, taxi and rent-a-car services are available. In Frankfurt you have a direct “High-Speed-Connection” with the ICE-Trains to Ulm (approx. 2 hours).

Accommodation

Please book your accommodation by yourself via www.hrs.com or www.trivago.com

Registration

Online:

<http://www.wbzu.de/veranstaltungen/74/133-First-International-Zinc-Air-Battery-Workshop-1st-IZABW>

You can also fill in the registration form (page 7) and send it to:

E-Mail: tina.betz@wbzu.de, Fax +49 (0)731 1 75 89-10

Note:

Participation in this workshop is only possible following registration using this application form. All participants are kindly requested to register latest March 24. **There is no walk-in registration.**

Registration Fee

No conference fee.

The 1st ZAB Workshop will be sponsored by the German *Ministry for Education and Research* and other Organizers.

Meeting Place – ULM

(A. Einstein´s home town)

WBZU

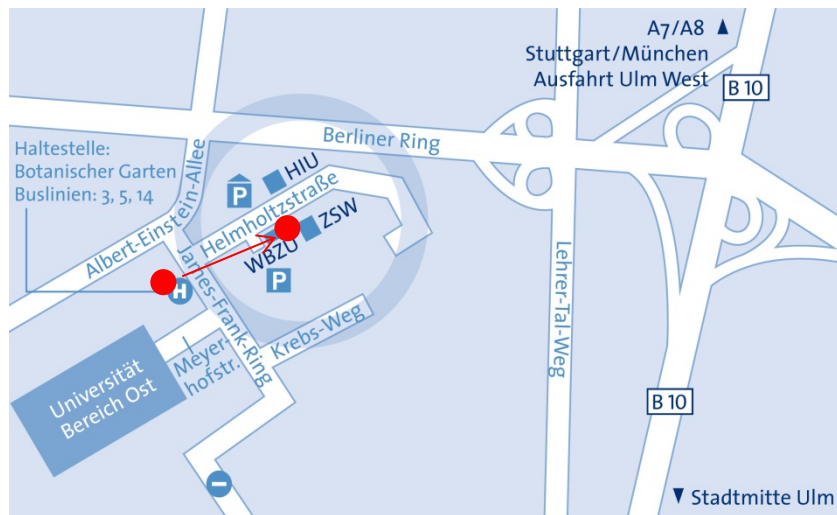
Helmholtzstraße 6

D-89081 Ulm (Germany)

www.wbzu.de



From Ulm’s main railway station, take No 3 bus route towards Wissenschaftsstadt and get off at the Botanical Gardens bus stop. Follow the path alongside the bus stop until the WBZU building appears on the right hand side (bus journey time 15 min., distance on foot 5 min.).



Parking lots you can find directly at WBZU or in the parking garage opposite to the WBZU.

Parking fees 0,50 Euro per hour / maximum per day 5,00 Euro

Scientific Committee

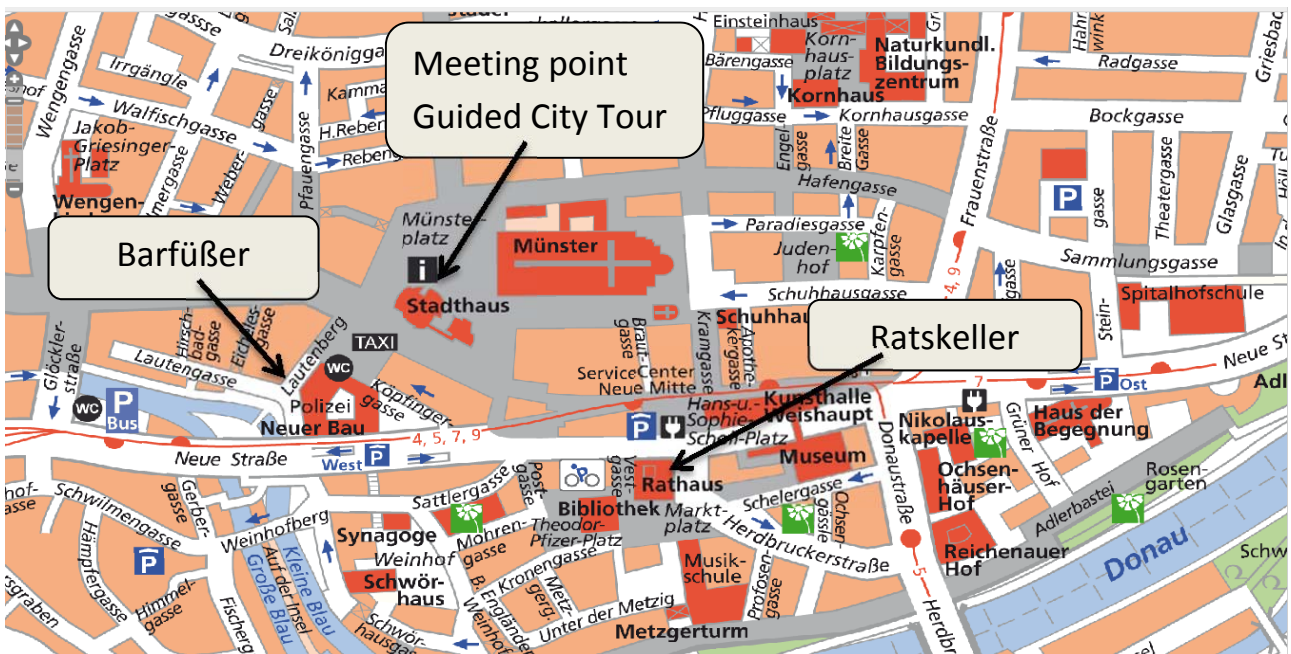
- Kerstin ANNASSI (PT Jülich)
- Jean-Francois DRILLET (DECHEMA, Frankfurt/Main)
- Frank ENDRES (Clausthal University of Technology)
- Juergen GARCHE (FCBAT, Ulm)
- Bernhard GOLLAS (TU Graz, Österreich)
- Bernd KREIDLER (VARTA Microbatteries, Ellwangen)
- Arnulf LATZ (DLR, HIU, Ulm)
- Boris MONAHOV (ILZRO, USA)
- Zempachi OGUMI (Kyoto University, Japan)
- Pucheng PEI (Tsinghua University Beijing, China)
- Hans-Ulrich REICHARDT (Clausthal University of Technology)
- Gongquan SUN (DICP Dalian, China)
- Yun ZONG (IMRE, Singapore)

Social Events

Get Together 4th April 2016 (Monday) 18:00 h – 20:00 h
at 17:00 h the registration will start at the same place
Ratskeller, Marktplatz 1, 89073 Ulm
(free of charge: light meal, soft drinks, beer)

Guided City Tour 5th April 2016 (Tuesday) 18:30 h – 19:30 h
Town house on the Minster Square, Tourist
Information (Stadthaus am Münster) Münsterplatz 50, 89073 Ulm
The tour will be finished at the dinner place
(free of charge: light meal, soft drinks, beer)

Dinner 5th April 2016 (Tuesday) 19:30 h
Barfüßer, Lautenberg 1, 89073 Ulm
(free of charge: light meal, soft drinks, beer)



Program

1st IZABW, 5th – 6th April 2016

4th April 2016 (Monday) – Ratskeller

- 17:00 – 18:00 **Registration**
18:00 – 20:00 **Get Together** (see Social Events)

5th April 2016 (Tuesday) – WBZU Ulm, Helmholtzstr. 6

- 08:30 – 10:00 **Registration**
10:00 – 10:15 **Opening**
Kerstin Annassi, PtJ Jülich (Germany)
Jürgen Garche, ZSW Ulm (Germany)

Chairmanship **Hajime Arai, Kaushik Jayasayee**

- I-1 10:15 – 10:45 **Overview about commercial Zn/air batteries**
Ulrich Kohls, Bernd Kreidler, Cornelia Wiedemann, Rainer Hald
VARTA Microbattery GmbH Ellwangen (Germany)
- I-2 10:45 – 11:15 **Overview about R&D of rechargeable Zn/air batteries**
Erdong Wang, Zhao Yan, Luhuang Jiang, Gongquan Sun
Dalian Institute for Chemical Physics, Dalian (China)
- 11:15 – 11:45 **Break**
- I-3 11:45 – 12:15 **Development potential for Zn/air batteries**
Ulrich Kunz¹, Jens Riede¹, Marina Bokelmann¹, Thomas Turek¹, Arno Kwade², Paul Titscher²
¹ Clausthal University of Technology and Energie-Forschungszentrum Niedersachsen, ² Technical University Carolo-Wilhelmina Braunschweig, (Germany)
- I-4 12:15 – 12:45 **The soluble Zn electrode in Zn/air – redox flow batteries**
Bernhard Gollas, Christian Zelger
Technical University of Graz (Austria)
- 12:45 – 13:45 **Lunch**
- Chairmanship** **Bernhard Gollas, Tejs Vegge**
- I-5 13:45 – 14:15 **Solubility controlled rechargeable Zn electrodes**
Hajime Arai, Akiyoshi Nakata, Koji Nishio and Zempachi Ogumi
Kyoto University (Japan)
- I-6 14:15 – 14:45 **Development challenges of Zn electrode**
Viktor Gogel, Ludwig Jörissen
ZSW Ulm (Germany)

- I-7 14:45 – 15:15 **Gas diffusion electrodes for metal/air batteries: state-of-the-art, perspectives and challenges**
Jean-Francois Drillet, Nicky Bogolowski und Mariappan Sakthivel
 DECHEMA, Frankfurt (Germany)
- 15:15 – 15:30 **Break**
- Chairmanship** **Jean-Francois Drillet, Bernd Kreidler**
- I-8 15:30 – 16:00 **Mn_xO_y catalyst and electrolytes**
J. Alberto Blázquez¹, Aroa R. Mainar^{1,2}, Olatz Leonet¹, Juan J. Iruin²,
 Norbert Wagner³, Alexander Niederstrasser³
¹ IK4-CIDETEC San Sebastián (Spain), ² Universidad del País Vasco San Sebastián (Spain); ³ DLR Stuttgart (Germany)
- I-9 16:00 – 16:30 **Development of bifunctional catalysts/electrodes – Performance assessment at lab-scale under realistic rechargeable Zn-Air battery operating conditions**
 Luis.Cesar Colmenares¹, Kaushik Jayasayee¹, Sidsel. M. Hanetho¹,
 Mari Juel¹, Sophie Labonnote-Weber², Guttorm Syvertsen-Wiig²,
 Norbert Wagner³, Dennis Wittmaier³, Alexander Niederstrasser³,
 Alberto Blázquez⁴, Aroa R. Mainar⁴, Idoia Urdampilleta⁴
¹ SINTEF Materials and Chemistry Department of New Energy Solutions. Trondheim (Norway), ³ DLR Stuttgart, Germany, IK4-CIDETEC, San Sebastián, Spain
- I-10 16:30 – 17:00 **The triple-phase boundary – tailored pore morphology, wetting and catalyst deactivation**
 Rüdiger-A. Eichel^{1,2}, Josef Granwehr^{1,3}, Hans Kungl¹, Steffen Merz¹,
 Hermann Tempel¹, Zhiyuan Wang¹, Henning Weinrich¹
¹ Forschungszentrum Jülich, Institut für Energie- und Klimaforschung, Grundlagen der Elektrochemie (IEK-9), 52425 Jülich, Germany
² RWTH Aachen University, Institut für Physikalische Chemie, Germany
³ RWTH Aachen University, Institut für Technische und Makromolekulare Chemie
- 18:30 – 19:30 **Guided City Tour** - (see Social Events)
- 19:30 **Dinner** (see Social Events)

6th April 2016 (Wednesday) – WBZU Ulm, Helmholtzstr. 6

Chairmanship **M. Assunta Navarra, Raihan Othman**

- II-1 09:00 – 09:30 **Ionic liquid based electrolytes: from the interface to the bulk phase**
 Frank Endres
 Clausthal University of Technology (Germany)
- II-2 09:30 – 10:00 **Neutral electrolyte: making it work for Zn/air batteries**
 Xiaoming Ge, F.W. Thomas Goh, Afriyanti Sumboja, Zhaolin Liu and
Yun Zong
 Institute of Materials Research and Engineering (Singapore)

- II-3 10:00 – 10:30 **AZA developments of Zn/air battery**
Jean-François Fauvarque, Suren Martirosyan, Didier Guillonnet
 AZA Battery, Paris (France)
- 11:00 – 11:30 **Break**
- II-4 11:30 – 12:00 **From ZOXY to 3E, first and next steps on the way to commercial Zn/air-accumulators**
Hans-Jürgen Pauling, Markus Kunkel
 3e Batterie-Systeme GmbH, Düsseldorf (Germany)
- II-5 12:00 – 12:30 **Zn/air-flow-batteries: prospects and challenges**
Michael Lanfranconi, Hans-Joachim Lilienhof
 Westfälische Hochschule, Gelsenkirchen (Germany)
- 12:30 – 14:00 **Lunch**
- Chairmanship** **Jean-François Fauvarque, Yun Zong**
- II-6 14:00 – 14:30 **Microbial Zn/air cell**
 N. Ahmad, R. Othman and A.Z. Ahmad Azhar
 International Islamic University Malaysia, Kuala Lumpur (Malaysia)
- II-7 14:30 – 15:00 **Synchrotron-based X-ray microspectroelectrochemical studies of Zn/air batteries**
Benedetto Bozzini, Matteo Amati, Patrizia Bocchetta, Alessandra Gianoncelli, Luca Gregoratti, Claudio Mele and Maya Kiskinova
 Università del Salento, Lecce (Italy)
- II-8 15:00 – 15:30 **Coupled modeling of transport and electrochemistry in Zn/air batteries**
Arnulf Latz, Simon Clark, Johannes Stamm, Timo Danner, Birger Horstmann
 Helmholtz Institute Ulm (Germany)
- II-9 15:30 – 16:00 **Atomic-scale modelling of electrode reactions in Zn/air batteries**
Tejs Vegge, Vladimir Tripkovic, Steen Lysgaard, Heine A. Hansen, Juan Maria Garcia Lastra
 Technical University of Denmark (Denmark)
- 16:00 – 16:15 **Closing**
 Frank Endres
 Clausthal University of Technology (Germany)
- 16:30 – 19:00 **Visit ZSW (Helmholtzstraße 8) and Farewell Party at WBZU (Helmholtzstr. 6)**

Posters

- P-1 **Visualizing Reaction and Transport Processes in Zinc-Air-Batteries via X-ray Tomography**
Daniel Schröder¹, Tobias Arlt², Ingo Manke², Jürgen Janek¹
¹Physikalisch-Chemisches Institut, Justus-Liebig-Universität Gießen (Germany),
²Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin (Germany)
- P-2 **Ionic Liquids as possible Electrolytes for Zinc Air Batteries**
Maria Ahrens¹, Thomas J. S: Schubert¹
¹IOLITEC Ionic Liquids Technologies GmbH, Heilbronn (Germany)
- P-3 **Development and characterization of bi-functional cathodes for secondary zinc-air batteries**
Borislav Abrashev¹, Dzhamal Uzun¹, Konstantin Petrov¹, Alexander Niederstrasser², Norbert Wagner²
¹Acad. Evgeni Budevski Institute of Electrochemistry and Energy Systems, Bulgarian Academy of Sciences, Sofia (Bulgaria)
²German Aerospace Center, Institute of Engineering Thermodynamics, Stuttgart (Germany)
- P-4 **Influence of Pulse Charging on Air Electrodes**
Birgit Pichler¹, Stephan Weinberger¹, Viktor Hacker¹
¹ Institute of Chemical Engineering and Environmental Technology, University of Technology, Graz (Austria)
- P-5 **Gas diffusion electrodes for rechargeable Al- and Zn-air batteries with ionic liquid electrolyte**
Nicky Bogolowski, O. Ngaleu, Jean-Francois Drillet
DECHEMA-Forschungsinstitut, Frankfurt am Main (Germany)
- P-6 **Preliminary Study on Rechargeable Zinc–Air Battery using Protic Ionic Liquids as Electrolyte**
Piyush Ingale, Mariappan Sakthivel, Jean-Francois Drillet
DECHEMA-Forschungsinstitut, Frankfurt am Main (Germany)
- P-7 **An electrochemical approach to mitigate dendrite formation in Zn electrodes**
Grecia García, Edgar Ventosa, Wolfgang Schuhmann
Analytical Chemistry – Center for Electrochemical Sciences (CES),
Ruhr-University Bochum (Germany)
- P-8 **Modeling Zinc-Air Batteries with Ionic Liquids**
Max Schammer^{1,2,3}, Birger Horstmann^{1,2} and Arnulf Latz^{1,2,3}
¹Helmholtz Institute Ulm (Germany) , ²German Aerospace Center, Stuttgart (Germany),
³University of Ulm (Germany)
- P-9 **Scale-up of a zinc-air redox flow battery system: LIFE ZAESS PROJECT**
Belén Amunátegui, Ana Ibáñez, Miguel Sierra and Manuel Pérez
Técnicas Reunidas, San Fernando de Henares, Madrid (Spain)

7th April 2016 (Thursday) - ZSW Ulm, Helmholtzstr. 8, Room 707

08:30 – 10:00 **Round table discussion - strategic development of Zn/air batteries
(open for the public)**