

Chairman's Welcome Message

Encouraging the active scientific dialogue between scientists in the field of impedance spectroscopy from different backgrounds and fields of science and technology is the aspired aim of the international workshop on impedance spectroscopy (IWIS).

Scientists working in different fields of research, such as electro chemistry, material science, biology and medicine, electronics and sensors meet together and present recent developments and findings. Tutorials give a good overview of special basics all around the method and make this challenging measurement method better accessible. An exhibition informs about the latest news concerning measurement equipment and devices. These are the main components of this annual international workshop taking place at Technische Universität Chemnitz.

The IWIS workshop has established itself since seven years as a platform for promoting experience exchange and networking in the scientific and industrial field. In its seventh edition the IWIS workshop includes more than forty contributions from 12 countries in 13 sessions, four plenary talks and seven tutorials. Selected contributions from the workshop will be published as post conference proceedings within the book series Lecture Notes on Impedance Spectroscopy by Taylor & Francis. The peer reviewed series aims to highlight new advances and presents different approaches in dealing with impedance spectroscopy including modeling, measurement and applications.

In IWIS 2014 the Circle of Experts in Impedance Spectroscopy (CEIS) will be meeting to discuss novel topics together within a network of outstanding specialists and professionals from science and industry.

The organization of the workshop has requested a considerable effort of the organizing team from the chair for measurement and sensor technology which makes it possible to organize this international event actually within Technische Universität Chemnitz.

We thank the IEEE Instrumentation and Measurement Chapter Germany for the technical assistance of the event. The workshop was co-organized by the Chemnitz School of Metrology (CSM e.V.), whose support for the event is highly acknowledged.

We would like to thank you for choosing IWIS 2014 and for coming to Chemnitz

Prof. Olfa Kanoun
General Chair

IWIS 2014 Organizers

General Chair

Olfa Kanoun

Honory Chair

H.-R. Tränkler

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General Information

The City of Chemnitz

Chemnitz, more than 800 years old, is situated in the heart of Saxony. The city is the third-largest in Saxony and is designated as “City of Modernity”. Developed at the time of Classical Modernism, it became the “Manchester on Saxony”, giving impulses to the development of business and science. The influences of the cultural and architectural Modernism are visible so that Chemnitz is today city with many interesting facets. Fascinating architecture reflects the changing times and spirit of those things which have shaped the city: industrial monuments, redeveloped Gründerzeit residential quarters such as Kassberg, Villa Esche or the city centre, which has been completely modified since reunification, constructed by Helmut Jahn, Hans Kollhoff and Christoph Ingenhoven, bridge the gap from yesterday to today and to tomorrow.

Bars & Restaurants

If you want to spend one evening in the modern city-center of Chemnitz, there is a couple of nice bars and restaurants around. You may want to try the following:

Tillmanns – Brückenstraße 17, www.tillmanns-chemnitz.de
Turmbrauhaus – Neumarkt 2, www.turmbrauhaus.de
La Bouchée – Innere Klosterstraße 9, www.la-bouchee.de
Buono – Theaterstraße 7, www.bouno-chemnitz.de
Henrics – Theaterstraße 11, www.henrics-lounge.de
Janssen – Schloßstraße 12, www.janssen-restaurant.de
Brazil – Innere Klosterstraße 10, www.restaurant-brazil.de
Café Moskau – Straße der Nationen 56, www.cafemoskau-chemnitz.de
Diebels Fasskeller – An der Markthalle 3, www.fasskeller.de
Ratskeller – Markt 1, www.ratskeller-chemnitz.de
Bar Mozart – Strasse der Nationen 56, www.mozartbar-chemnitz.de
Esperanto – Carolastraße 7, www.esperanto-network.de
Maroon – Ulmenstraße 16, www.maroon-bar.de
City Pub – Brückenstraße 17, www.tower-pub.de
Schalom Restaurant – Heinrich-Zille-Straße 15, www.schalom-chemnitz.de

Conference Venue

The International Workshop on Impedance Spectroscopy will take place at the Campus of Chemnitz University of Technology. You can find it at:

Technische Universität Chemnitz
Neues Hörsaal und Seminargebäude
Reichenhainer Straße 90
09126 Chemnitz

Social Event – Discover the Saxon provincial capital Dresden

On Wednesday afternoon participants of the IMEKO-Conference and the IWIS Workshop are invited to join the Dresden city tour. The bus transport will depart at 4:30 pm from the conference site Reichenhainer Straße 90 to Dresden. Due to the environmental focus of the IMEKO and the aspects of electrochemical analysis in IWIS the guided city tour will have a special reference to the flooding events of the near past.

The tour will end at Brühl's Terrace. The excellent view over the famous historical centre of Dresden is almost mandatory for all tourists visiting the city. The final event is rustic buffet at the old restaurant with own brewery "Ball- und Brauhaus Watzke". This location with the unique combination of an historical ballroom and brewery will be the perfect place to discuss the impression of the day. The bus transport back to the conference site in Chemnitz is planned for 11:00 pm.



Ball- und Brauhaus Watzke (©Ball- und Brauhaus Watzke)

Special Dinner – Ratskeller

The social highlight of the IWIS14 will be held in the “Ratskeller” in the centre of Chemnitz. The beautiful cellar restaurant in the 500 year old historical town hall provides special atmosphere. The dinner will start at 7:00 pm. At 9:00 pm there will be a guided tour in the tower of the town hall for all interested participants. Lots of stories and fairy tales combined with a wonderful view over the nightly Chemnitz are included.



Ratskeller Chemnitz (©Ratskeller Chemnitz)

Travel to Chemnitz

You can reach Chemnitz University of Technology via car and train.

By Car from Autobahn A72:

- Take the motorway exit 'Chemnitz Süd'
- Use B173 / Neefestraße direction 'Stadtzentrum'
- After 1 km turn right on the B169 / 'Südring'
- After 5.5 km use exit 'Reichenhainer Straße' direction 'Technische Universität'
- You'll reach campus after 1.5 km, the conference venue is on the left side

By Car from Autobahn A4:

- Take the motorway exit 'Chemnitz Mitte'
- Use B95 and go straight ahead until B95 turns left - don't turn left
- Go ahead on 'Gustav Freytag Straße' and turn right at the 'Reichenhainer Straße'
- After 1.3 km you'll reach campus, the conference venue is on the right side

By train:

- Get off at Chemnitz central station and use tram 6 or 522 direction 'Zentralhaltestelle'
- Get off the tram at Station 'Roter Turm'
- Use Bus 51 direction 'Altchemnitz' or 'Reichenhain'
- Get off at 'TU Campus Reichenhainer Straße'

Airport:

- The next nearby Airports are Dresden and Leipzig
 - From airport Dresden go A4 direction Chemnitz/Erfurt.
 - From airport Leipzig-Halle go on A14 direction Dresden, at 'Dreieck Nossen'
- go on A4 direction Chemnitz/Erfurt. Proceed as described above.

Taxi

If you need a taxi in Chemnitz call: +49 371 369 000

Getting Around in Chemnitz

All buses and trams in Chemnitz meet at the Central Bus Station ('Zentralhaltestelle').

Information about public transport and timetables you can find here:

www.cvag.de

www.opnvkarte.de



Map of the City Centre Chemnitz

Getting from the Hotel Mercure to the university:

Take a 5 to 10 minute walk to the bus station 'Roter Turm', closely located to the hotel Mercure and take the bus line 51 or E51 into direction 'Chemnitz, Altchemnitz' or 'Chemnitz, Reichenhain'. The station at the university is named 'TU Campus' and is directly in front of the entrance to the university.

Internet Access

During the event wireless network is available at the campus site. Please use the following registration information to login:

Network name – “**special**”

WPA2 key – “**iwis-imeko-2014**”

If you have problems connecting to the network please ask organizers for help.

Exhibition

During the workshop the following exhibitors will be present:



Program

Wednesday, September 24th, 2014

The workshop takes place in the central lecture hall.

8:00 – 8:30	Registration
8:30 – 9:20	Tutorial 1 Impedance measurement methods from DC to THz B. Schweiger, Keysight Technologies
9:30 – 10:20	Tutorial 2 Barrier coatings from the point of view of EIS Dr. W. Strunz, ZAHNER-Elektrik GmbH & Co. KG
10:30 – 11:20	Tutorial 3 Low-noise circuits and instrumentation for microscale impedance spectroscopy Prof Dr. M. Carminati, Politecnico di Milano
11:30 – 12:20	Tutorial 4 Bioimpedance basics: including electrode systems, sensitivity field calculations, etc. Prof Dr. Scient. Ørjan Grøttem Martinsen, University of Oslo
12:20 – 13:20	Lunch
13:30 – 14:20	Tutorial 5 Understanding the Error Structure of Electrochemical Impedance Spectroscopy Prof M. E. Orazem, University of Florida
14:30 – 15:20	Tutorial 6 Spectroscopy of time-variant impedances Prof M. Min, Tallin University
15:30 – 16:20	Tutorial 7 Time domain reflectometry for broad bandwidth impedance spectroscopy Prof Dr.-Ing. U. Pliquet, TU Ilmenau
16:30 – 23:00	Social program

Thursday, September 25th, 2014

8:00 – 8:30 **Registration**

8:30 – 8:45 **Opening**

8:45 – 9:30 **Plenary Talk** - Challenges for Electrochemical Impedance Spectroscopy; Prof. Mark E. Orazem

Session 1 - System Identification and Fundamentals I

Chair: M. E. Orazem

9:30 – 10:30 Functional Fractional Calculus For Identification Of Time Variant Systems; *M. Eckert; M. Kupper; S. Hohmann*

Streamlining Calculation Of The Distribution Of Relaxation Times From Time Domain Data; *P. Bueschel; T. Günther; P. Winkler; O. Kanoun*

Analyzing The Capacitive Region Of Impedance Spectra Using A Distribution Function Of Differential Capacities; *M. Schönleber; E. Ivers-Tiffée*

10:30 – 11:00 **Coffee Break**

Session 2 - System Identification and Fundamentals II

Chair: M. Min

The Influence Of The Settling Behavior On The Measurement Uncertainty Of Eis And How To Decrease The Measurement Duration By Error Prediction; *T. Baumhöfer; S. Rothgang; D. U. Sauer*

Electrical Equivalent Circuits For Straightforward Parameter Extraction Of Underlying Physical Processes; *J. A. Amani; T. Koppe; H. Hofsäss; U. Vetter*

12:20 – 13:20 **Lunch**

13:20 – 13:50 **Plenary Talk** - From single cells to photons: the versatility of contactless impedance sensing; Prof Dr. M. Carminati

13:50 – 14:20 **CEIS I, Exhibitors Presentations**

14:20 – 15:05 **Plenary Talk** - From Impedance Spectroscopy to Fractional System Identification: There and Back again; Prof. Sören Hohmann

Session 3 - Battery I

Chair: S. Hohmann

- 15:05 – 15:45 Low-frequency Behavior Of Nickel Manganese Cobalt Based Lithium-ion Batteries; *F. E. Hust; J. Xie; D. U. Sauer*
- Lithium Ion Battery Model Parameterization With Eis Measurements And Voltage Relaxation; *H. Witzenzausen; F. E. Hust; D. U. Sauer*
- Production And Characterization Of Carbon-free Bi-functional Cathodes For The Use In Lithium-air Batteries With An Aqueous Alkaline Electrolyte; *N. Wagner; D. Wittmaier; K. A. Friedrich*

15:45 – 16:15 **CEIS II, Poster Session and Coffee Break**

Session 4 - Battery II

Chair: N. Wagner

- 16:15 – 17:15 Ageing Investigation Of Lithium-ion Batteries With A Combination Of Eis And Structural Analysis; *D. Kober; J. Kowal; O. Goerke*
- State-of-charge And State-of-health Estimation Of Commercial Lifepo4 Batteries By Means Of Impedance Spectroscopy; *F.-M. Cuibus; S. Ivanov; U. Schwalbe; M. Schilling; A. Bund*
- Online Estimation Of The Electrical Impedance; *H. Piret; P. Granjon; V. Cattin; N. Guilet*
- Fast Broadband Impedance Measurement for Batterydiagnosis in Embedded Systems; *T. Günther, P. Büschel, P. Winkler and O. Kanoun*
- 19:00 – 23:00 **Special Dinner**

Friday, September 26th, 2014

8:30 – 9:15 **Plenary Talk** - Skin impedance - the inexhaustible source;
Prof. Ørjan Grøttem Martinsen

Session 5 - Biomedical I

Chair: O. G. Martinsen

9:15 – 10:15 Design Of Bioimpedance Sensors: Unique Study Tool Composed
Of Saline Phantoms, Numerical Modeling And Impedance Spec-
troscopy; *P. Pham; P. B.-Franco; E. McAdams*

Impedimetric Measurement Of Bacterial Growth In Microfluidic
Segments; *N. Karippai; S. Wiedemeier; A. Lindenabeuer; A. Barthel; T. Nacke; G. Gastrock; B. Cahill*

Session 5 - Materials, Films & Interfaces I

Chair: P. Büschel

9:15 – 10:15 Measurement Of The Temperature Dependent Sodium Ion Con-
ductivity Of Sodium- β -aluminate Ceramics By Impedance Spec-
troscopy; *M. Grund; U. Sydow; M. Schulz*

Ac Impedance Investigation Of The Multi-walled Carbon Nano-
tubes / Pedot:pss Nanocomposites Fabricated At Different Soni-
cation Times; *A. Sanli; A. Benchirouf; S. D. Paul; S. K. Choud-
hary; A. S. Thakur; I. El-Houdaigui; C. Müller; O. Kanoun*

Session 6 - Biomedical II

Chair: U. Pliquet

10:45 – 12:20 Electric Impedance Measurement Of Tissue Phantom Materials
For Development Of Medical Diagnostic Systems; *H. Kōiv; K. Pesti; R. Gordon*

Detecting Clinical Biomarkers Using Impedance Spectroscopy; *R. Sharma; C. Walti*

Session 6 - Materials, Films & Interfaces II

Chair: M. Orazem

10:45 – 12:20 Uv-cured Copolymers With Gradient-tailored Composition As Electrolytes For Dsscs With Improved Electrode/electrolyte Interfaces; *A. Sacco; F. Bella; S. De La Pierre; M. Castellino; S. Bianco; R. Bongiovanni*

Impedance Of (un)modified Glass-like Carbon Electrode: A New Interpretation; *K. Magdic; V. H.-Radosevic; K. Kvastek*

Impedance Spectroscopy Of Aluminum Oxide Film Deposited Using Ald Technique; *R. Singh; V. Vandana; J. Panigrahi; J. Gope; N. Batra; P. Singh*

12:20 – 13:20 **Lunch, Exhibition**

Session 6 - Sensors & Devices

Chair: J. Himmel

13:20 – 15:00 Impedance Spectroscopy Of Msdi (molecular Semiconductor-doped Insulator) Ammonia Sensors; *M. Schüler; P. Gaudillat; T. Sauerwald; M. Bouwet; A. Schütze*

Capacitive Measurement Setup For Characterizing Thin Layers Of Aqueous Solutions; *C. Weber; M. Tahedl; O. Kanoun*

Determination Of The Pore Size Distributions Of Porous Membranes By Impedance Spectroscopy; *S. Bannwarth; H. Coster; M. Wessling*

Comparison Of Different Nanostructured Tio₂ And Zno Photoelectrodes For Solar Water Splitting; *D. Hidalgo; A. Sacco; A. Lamberti; A. Chiodoni; V. Cauda; E. Tresso; S. Hernández*

15:00 **Closure**

Publications series

O. Kanoun (Ed.)

Lecture Notes on Impedance Spectroscopy: Measurement, Modeling and Applications

Vol. 4, ISBN 978-1-138-00140-4 (Hbk), 2013

Vol. 3, ISBN 978-0-415-64430-3 (Hbk), 2012

Vol. 2, ISBN 978-0-415-69838-2 (Hbk), 2011

Vol. 1, ISBN 978-0-415-68405-7 (Hbk), 2011

A book of the same series will be published based on selected contributions from the IWIS 2014.