

# Chairman's Welcome Message

The active dialogue in the field of impedance spectroscopy between scientists from different fields of science and technology is the aspired aim of the international workshop on impedance spectroscopy (IWIS). Scientific results from different fields of research, such as electro chemistry, material science, biology and medicine, electronics and sensors report on recent advances in impedance spectroscopy. Tutorials provide a overview of special basics all around the method and make this challenging measurement method better accessible for young scientists. An exhibition informs about the latest news concerning measurement equipment and devices. These are main components of this annual international workshop taking place at Technische Universität Chemnitz.

In its eighth edition the IWIS workshop includes more than 40 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 a novel book series by De Gruyter. 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 2015 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 2015 and for coming to Chemnitz

Prof. Olfa Kanoun  
General Chair

# IWIS 2015 Organizers

## General Chair

Olfa Kanoun

## Honory Chair

H.-R. Tränkler

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## Publication Chair

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## Organizing Committee Chair

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## Organisation Committee

K. Schütze (DE)	D. Fleischer (DE)
F. Wendler (DE)	A. Fendri (TN)
M. Götz (DE)	

**Contact Information**

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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.



Rathaus, Neumarkt(©CWE - Chemnitz)



## **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](http://www.tillmanns-chemnitz.de)

Turmbrauhaus – Neumarkt 2, [www.turmbrauhaus.de](http://www.turmbrauhaus.de)

La Bouchée – Innere Klosterstraße 9, [www.la-bouchee.de](http://www.la-bouchee.de)

Buono – Theaterstraße 7, [www.bouno-chemnitz.de](http://www.bouno-chemnitz.de)

Henrics – Theaterstraße 11, [www.henrics-lounge.de](http://www.henrics-lounge.de)

Janssen – Schloßstraße 12, [www.janssen-restaurant.de](http://www.janssen-restaurant.de)

Brazil – Innere Klosterstraße 10, [www.restaurant-brazil.de](http://www.restaurant-brazil.de)

Diebels Fasskeller – An der Markthalle 3, [www.fasskeller.de](http://www.fasskeller.de)

Ratskeller – Markt 1, [www.ratskeller-chemnitz.de](http://www.ratskeller-chemnitz.de)

Bar Mozart – Strasse der Nationen 56, [www.mozartbar-chemnitz.de](http://www.mozartbar-chemnitz.de)

Esperanto – Carolastraße 7, [www.esperanto-network.de](http://www.esperanto-network.de)

Maroon – Ulmenstraße 16, [www.maroon-bar.de](http://www.maroon-bar.de)

City Pub – Brückenstraße 17, [www.tower-pub.de](http://www.tower-pub.de)

Schalom Restaurant – Heinrich-Zille-Straße 15, [www.schalom-chemnitz.de](http://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 Ore Mountains

On Wednesday afternoon participants of the IWIS Workshop are invited to join an excursion that will lead us under the surface and inside a mountain. We will visit the old silver mine “Markus Röhling Stollen” in the Ore Mountains and will discover the mining from the bismuth up to the beginning of silver mining. Very imposing is a reconstructed and well going old waterwheel for the water pumps. That’s technology of its best. The bus transport will depart at 3:30 pm from the conference site Reichenhainer Straße 90.



Entrance of mine (©Besucherbergwerk Markus-Röhling-Stollen)

After this time with feeling as a miner there is at “Frohnauer Hammer” a nice place to take a rural dinner. This location with the unique combination of a historical restaurant and blacksmith working place will be the perfect place to discuss the impressions of the day. The bus transport back to the conference site in Chemnitz is planned for 10:00 pm.



Historic Restaurant and Schmiedehammerwerk (©Frohnauer Hammer)

## Special Dinner – State Archaeology Museum - SMAC

The social highlight of the IWIS'15 will be held in the State Archaeology Museum in Chemnitz called SMAC. It is situated in a representative building from the period modernism in the heart of Chemnitz. After four years of reconstruction the earlier mall the building was reopened in 2014. So enjoy the special architecture and a small tour through the exposition during the evening. Presented is the development of Saxonia from the first times with hunters and collectors before round about 300.000 years until to the earliest industrial periods.

And of course you will have there an excellent dinner ...



State Archaeology Museum - SMAC (©SMAC Chemnitz)

## Travel to Chemnitz

You can reach *Technische Universität Chemnitz* 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').

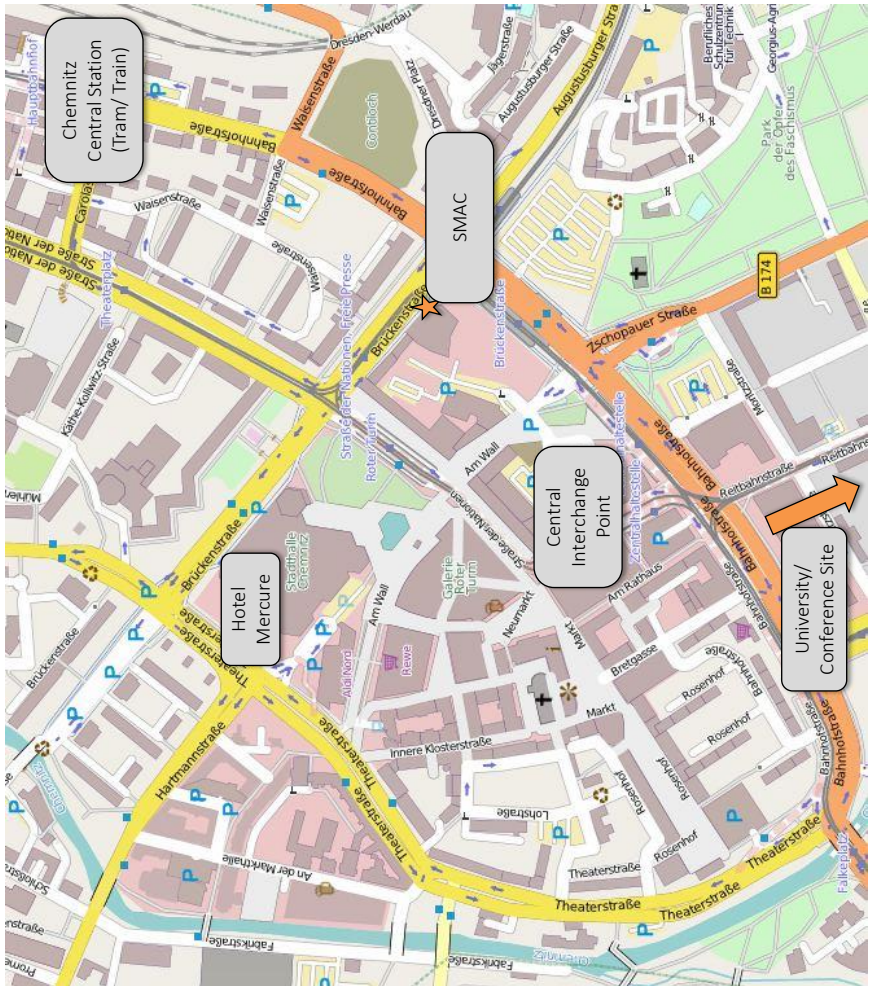
Information about public transport and timetables you can find here:

[www.cvag.de](http://www.cvag.de)

[www.öpnvkarte.de](http://www.öpnvkarte.de)

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.



Map of the City Centre Chemnitz

## **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-2015**”

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 23<sup>th</sup>, 2015

The workshop takes place in the central lecture hall.

8:00 – 9:00	<b>Registration</b>
9:00 – 9:50	<b>Tutorial 1</b> Fundamentals and Medical Applications of Bioelectrical Impedance Measurements Mark Ulbrich
10:00 – 10:50	<b>Tutorial 2</b> Biophysical model for bioimpedance: step-by-step fit for a particular object Prof. Dr. Uwe Pliquet
11:00 – 11:50	<b>Tutorial 3</b> Check of causality of measured EIS and modeling using DRT and equivalent circuits Dr. W. Strunz
12:00 – 13:00	<b>Lunch, Exhibition (Mensa)</b>
13:00 – 13:50	<b>Tutorial 4</b> Multisine-based fast EIS measurements in dynamic biomedical systems. Methods and applications Prof. Dr. Ramon Bragos
14:00 – 14:50	<b>Tutorial 5</b> Cell and molecule based microarray technology and multiparametrical monitoring Prof. Dr. Andrea A. Robitzki
15:00 – 16:30	<b>Impedance Spectroscopy in Battery Applications, Chair: Olfa Kanoun</b>
15:30 – 23:00	<b>Social program: Trip to Erzgebirge, Meet in front of lecture hall</b>

# Thursday, September 24<sup>th</sup>, 2015

8:00 – 8:30      **Registration (Registration Desk)**

8:30 – 8:45      **Opening: Chair: Olfa Kanoun**

8:45 – 9:30      **Plenary Talk** - Odd Random Phase Electrochemical Impedance Spectroscopy (ORP-EIS) as a tool for reliable electrochemical system identification Chair: Norbert Wagner; Annick Hubin

## **Session 1 - Fundamentals I**

9:30 – 10:10      Novel Multi-parametric Estimation Strategies For Spectral Data In Embedded Applications; *Frank Wendler; Paul Büschel; Olfa Kanoun*

Non-linear Eis For The Investigation Of Charge Transfer Kinetics; *Christian Heubner; Michael Schneider; Alexander Michaelis*

10:10 – 10:40      **Coffee Break (Foyer)**

## **Session 2 - Fundamentals II**

10:40 – 12:00      Frequency-dependent Phase Correction In Impedance Measurements; *Thomas Günther; Olfa Kanoun*

Determining Unambiguous Electrical Equivalent Circuits Representing The Underlying Physics; *Julian Alexander Amani; Tristan Koppe; Hans Hofsäss; Ulrich Vetter*

Impedance Measurement At High Frequencies Without Impedance- And Network Analyzers; *Uwe Tröltzsch*

12:00 – 13:00      **Lunch(Mensa)**

13:00 – 13:45      **Plenary Talk** - Plenary Talk: State of the Art of Batteries of the 4th Generation Chair: Annick Hubin; Norbert Wagner

13:45 – 14:15      **Exhibitors Presentations**

### Session 3 - Battery I

- 14:15 – 15:15    Implementation Of Electrochemical Impedance Spectroscopy In-to Common Battery Management Systems; *Hannes Nordmann; Martin Schüßler; Dirk Uwe Sauer*
- Simultaneous Eis Measurements On Several Single Cells In High Current Battery Stacks Involving Time-drift Removal By Z-hit; *Steffen Fröba; Carl-Albrecht Schiller; Michael Multerer; Werner Strunz*
- On-line State Estimation Of Automotive Batteries Using In-situ Impedance Spectroscopy; *Sebastian Socher; Claudius Jehle; Ulrich Potthoff*
- 15:15 – 16:00    **Poster Session & Student Award Embedded System**

### Session 4 - Battery and Cell Diagnosis

- 16:00 – 17:40    Measuring The Diffusion Impedance Of Electrolytes For Lithium Ion Batteries; *Michael Schönleber; Ellen Ivers-Tiffé*
- Electrochemical Impedance Spectroscopy As A Tool For Characterization Of Lithium Ion Battery Materials; *Johannes Landesfeind; Johannes Hattendorff; Andreas Ehrl; Wolfgang Wall; Hubert Gasteiger*
- Electrochemical Impedance Spectroscopy As A Tool To Investigate The Formation Process Of Li-ion Cells; *Christian Reinke; Kristian Nikolowski; Mareike Wolter; Alexander Michaelis*
- Visibility Of Ageing Processes In Lithium-ion Batteries By Impedance Spectroscopy; *Julia Kowal; Inna Kübler; Delf Kober; Oliver Görke; Aleksander Gurlo*
- A Study Of The Effect Of Short-term Relaxation On The Eis Test Technique For Ev Battery Cells; *Anup Barai; Andrew McGordon; Paul Jennings*
- 19:00 – 23:00    **Special Dinner: Staatliches Museum für Archäologie Chemnitz (SMAC), Stefan-Heym-Platz 1, 09111 Chemnitz**

# Friday, September 25<sup>th</sup>, 2015

08:30 – 09:15    **Plenary Talk** - Simulation of Bioelectrical Properties of Human Tissue for Medical Applications; Mark Ulbrich

## Session 5 - Bio-Impedance

9:15 – 10:15    Optimized Electrode Placement For Regional Impedance Measurements In The Lung; *Jakob Orschulik; Rudolf Petkau; Steffen Leonhardt; Daniel Teichmann*

Electrochemical Interfacial Impedance And Capacitive Biosensors For Medical Diagnostics; *Paulo Roberto Bueno*

Fast Electrical Characterization Of Biomaterials; *Uwe Pliquet*

## Session 5 - IS for Nanoscale

9:15 – 10:15    Nanoscale Electrical And Electrochemical Characterization Of Materials By Means Of Afm-based Techniques; *Bernhard Roling; Stephan Bradler; Valon Lushta; Andre Schirmeisen*

Ionic Hopping Conductivity In Natural Rubber?cellulose Green Nanocomposites As Battery Separators; *Alaa Ladhar; Mourad Arous; Hamid Kaddami; Mustapha Raihane; Ali Kallel; Manuel Pedro Fernando Graça; Luis Cadillon Costa*

Eis Study On Immobilized Conjugated Polymeric Composite Nanofibers; *A.Sezai Sarac*

10:15 – 10:45    **Poster & Coffee Break (Foyer)**

## Session 6 - Sensors

10:45 – 12:25    Optimizing Eddy Current Sensors For Cross-section Area Measurement; *Tino Morgenstern; Olfa Kanoun; Jörg Himmel*

Miniaturized And Label Free Impedimetric Immunosensor For Salmonella Typhimurium Detection; *Fabiana Arduini; Valeria Paglierini; Daniela Neagu; Sara Pascale; Elisabetta Delibato; E. Pucci; giuseppe palleschi; danila moscone*

Characterization Of Aqueous Solutions By Low Frequency Capacitive Measurements; *Christian Weber; Markus Tahedl; Olfa Kanoun*

12:25 – 13:25    **Lunch, Exhibition**

## Session 7 - Sensors & Devices

- 13:25 – 14:25    Materials Characterization; *Annick Hubin*  
Dielectric Spectroscopy Approach To Water Content In Winter Premium Diesel Fuel Assessment; *Łukasz Macioszek; Ryszard Rybski*  
Local Electrochemical Impedance Study Of Hematite/water Interface.; *Marie Lucas; Jean-François Boily*
- 14:25–15:00    **Closure: Chair: Olfa Kanoun**

## Publications series

O. Kanoun (Ed.)

### **Lecture Notes on Impedance Spectroscopy: Measurement, Modeling and Applications**

Vol. 5, ISBN 978-1-138-02754-1 (Hbk), 2015

Vol. 4, ISBN 978-1-138-00140-4 (Hbk), 2014

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

Vol. 2, ISBN 978-0-415-69838-2 (Hbk), 2012

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 2015.