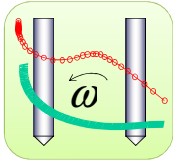


IS 2010



**International Workshop on Impedance Spectroscopy  
October 13-15 2010, Chemnitz - Germany**



## Final Program

Organized by:





## Chairman's Welcome Message

Impedance Spectroscopy is a powerful measurement method used in many application fields such as electro chemistry, material science, biology and medicine, semiconductor industry and sensors. The possibility to use information from complex impedance over a wide frequency range leads to interesting opportunities for separating effects, more accurate measurements and measurements of non-accessible quantities.

But dealing with Impedance Spectroscopy requires also in general competences in several fields of research, such as measurement technology, electro chemistry, modeling, mathematical and physical methods and nonlinear optimization. Depending on the specific challenges of the considered application there are generally more efforts to be done in one or two specific fields. The scientific dialogue between specialists of Impedance Spectroscopy, even working with different applications, can be therefore particularly profitable and inspiring.

The International Workshop on Impedance Spectroscopy has been launched already in June 2008 with the aim to serve as a platform for specialists and users to share experiences with each other. Since 2009 it became an international workshop addressing more fundamentals and application fields of Impedance Spectroscopy. With the 2010 edition, the workshop is gaining more acceptance in the scientific and industrial fields. Several tutorials were organized to fundamental topics of Impedance Spectroscopy. The scientific scope of the workshop includes interesting contributions to electrochemical systems, material measurement and testing, eddy current sensing, biological and medical applications, circuits and systems and corrosion. A poster session gives opportunity to discuss directly with authors about recent results. During the Workshop an exhibition allows to be informed about the latest news concerning measurement equipment and devices.

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 Chemnitz University of Technology. We thank the Chair for ergonomics (Prof. Spanner-Ulmer) for hosting the workshop and providing it a more familial ambient.

We thank also the IEEE Instrumentation and Measurement Chapter Germany for the technical support of the event.

We would like to thank the organizing and program committees for the huge work done and for the work still coming associated with the workshop proceedings.

We would like to thank you for choosing IS 2010 and for coming to Chemnitz!

Prof. Olfa Kanoun

General Chair

## IS-2010 Organizers

### General Chair:

O. Kanoun (D)

### Honorary Chair:

H.-R. Tränkler (D)

### Programm Committee:

E. Barsoukov (US)	R. Holze (D)	D. Macdonald (US)	D. U. Sauer (D)
V. Bilas (CR)	B. Isecke (D)	F. Mansfeld (US)	M. Schneider (D)
K. Darowicki (PI)	N. Jaffrezic-Renault (Fr)	M. Min (EST)	U. Tröltzsch (D)
M. Ferreira (P)	A. Lay-Ekuakille (I)	S.C. Mukhopadhyay (NZ)	W. Vonau (D)
D. Gürsoy (AU)	S. Leonhardt (D)	R. Pallas-Areny (SP)	N. Wagner (D)
A. Hartov (US)	M. Lohrengel (D)	A. Robitzki (D)	W. Yang (UK)
J. Himmel (D)	R. Luklum (D)	B. Roling (D)	P. Zoltowski (PL)

### Oganisation Committee:

T. Keutel (D)	M. Guermazi (TN)
P. Büschel (D)	D. Bouchaala (TN)
U. Tröltzsch (D)	X. Zhao (D)
K. Fichtner (D)	

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URL: <http://www.tu-chemnitz.de/etit/messtech/is/>

## 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 tomorrow.

### Conference Venue

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

Chemnitz University of Technology  
Universitätsteil Erfenschlager Straße  
Building C, Room 106  
Erfenschlager Straße 73  
09126 Chemnitz

### Trip to Dresden

On Wednesday 13<sup>th</sup> October a trip to Dresden is organized. The bus will leave at 15:00 from Erfenschlag Campus after the presentations and will arrive in Dresden at 16:00. In Dresden a 2 hours guided tour through the historical city centre is offered. After the guided tour you will have 1 hour free for yourself. The bus will leave at 19:00 from Dresden and arrive at 20:00 in Chemnitz. Please remark, there is no dinner organized during and after the trip to Dresden.

### Special Dinner

On Thursday 14<sup>th</sup> October at 19:00 the special dinner will take place in the festival room in the 3<sup>rd</sup> floor of the "tietz". The "tietz" is located in the city centre and can be reached by foot in 5 to 10 minutes from the Hotel Mercure (Figure 1). You can find it at the following address.

DAStietz  
Moritzstraße 20  
09111 Chemnitz  
<http://www.dastietz.de/>

### Accommodation

For your convenience the Hotel Mercure was chosen as a recommendation for your stay in Chemnitz. It is the highest building in the city center located close to the opera, the Galerie Roter Turm shopping mall and the town hall. The hotel provides you nicely arranged rooms and various recreational offers. Please get in contact with the hotel Mercure if you want to book a room.

Mercure Hotel Kongress Chemnitz  
Brückenstrasse 19  
09111 Chemnitz  
Phone: +49 371 6830  
Fax: +49 371 683505  
E-mail: [H1581@accor.com](mailto:H1581@accor.com)

Workshop attendees can book at special conditions until 10<sup>th</sup> October by mentioning the keyword "IS 2010".

Business Room Single	EUR 59,00 € per night (Incl. Breakfast)
Business Room Double	EUR 73,00 € per night (2 Pers., Incl. Breakfast)

For other hotels, feel free to ask Chemnitz tourist information:

Tourist-Information  
Markt 1  
09111 Chemnitz  
Phone: +49 371 690 680  
Fax: +49 371 690 6830  
E-mail: [info@chemnitz-tourismus.de](mailto:info@chemnitz-tourismus.de)

### **Travel to Chemnitz**

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

By car from motorway 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 the motorway exit 'Reichenhainer Straße' turn right direction 'Erfenschlag'
- You'll reach campus after 500 m, the conference venue is on the right side

By car from motorway 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 3.8 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 or E51 direction 'Altchemnitz'
- Get off at 'TU Erfenschlager Str'

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:

<http://www.cvag.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 'Chemnitz, TU Erfenschlager Str' and is directly in front of the entrance to the university.

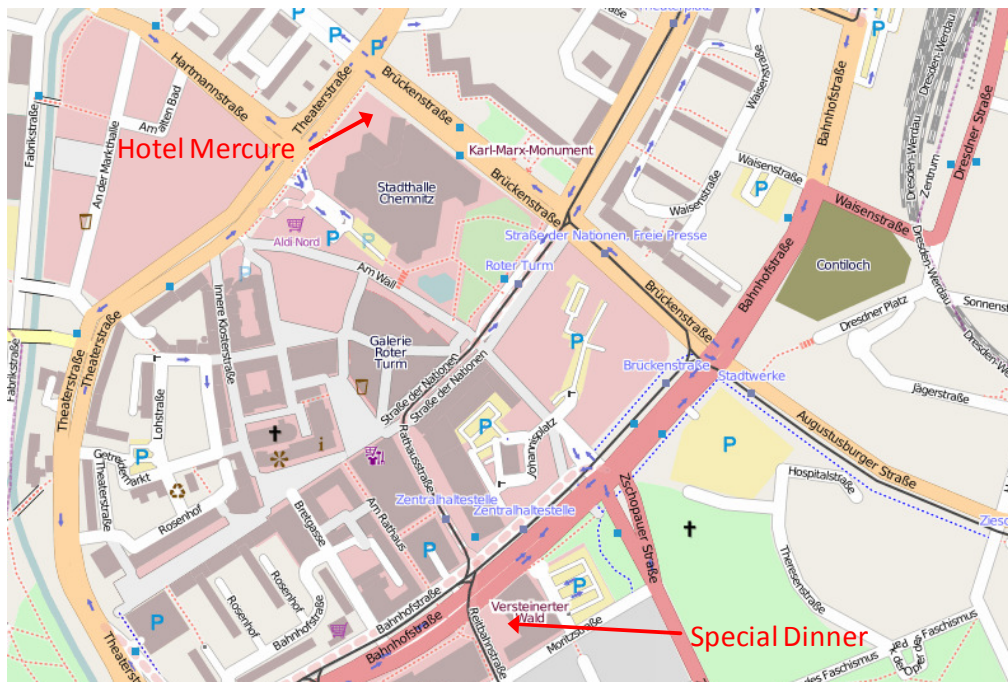


Figure 1: City center with hotel, location of the special dinner and bus station



Figure 2: Campus Erfenschlag

**Internet Access**

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

Network name:       special  
WPA key:             IS10-mst

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



## Exhibition

During the Workshop following exhibitors will be present:



**EKT** technologies

Zukunftsweisende Messtechnik zu fairen Preisen

**GAMRY**  
INSTRUMENTS

**HEKA**

scio  
spec  
scientific instruments



**Wayne Kerr  
Electronics**

**ZAHNER**<sup>®</sup>

M e s s y s t e m e

## Technical Program

The workshop takes place at the 'Universitätsteil Erfenschlager Straße' Building C in room 106.

**Wednesday, October 13<sup>th</sup>, 2010**

8:00        **Registration**

### **Tutorial 1**

9:00        Fundamentals of electrochemistry  
Prof. R. Holze, Chemnitz University of Technology

### **Tutorial 2**

10:00      Properties of coatings from the point of view of EIS  
W. Strunz, ZAHNER-Elektrik

### **Tutorial 3**

11:00      Representation of impedance data and nonlinear parameter estimation  
Dr. U. Tröltzsch, P. Büschel, Chemnitz University of Technology

12:00      **Lunch break**

### **Tutorial 4**

13:00      Impedance measurement methods from 10 Hz to 500 GHz  
B. Schweiger, Agilent Technologies

### **Tutorial 5**

14:00      Impedance measurements of lithium batteries at high currents  
Dr. I. Benecke, FuelCon

## **Social Program**

15:00      **Trip to Dresden**

appr. 20:00 **Arrival in Chemnitz**

**Thursday, October 14<sup>th</sup>, 2010**

8:00        **Registration**

8:30        **Opening**

**Plenary Talk**

8:45        EIS - Challenges and Limits  
M. M. Lohrengel, Physical Chemistry, Heinrich- Heine-University Düsseldorf

**Session 1: Fuel Cells**

9:30        Theory and Application of Electrochemical Impedance Spectroscopy for Fuel Cell Characterization  
N. Wagner, G. Schiller, K.A. Friedrich, German Aerospace Center (DLR)

9:50        A Heuristic Determination of Impedance Parameters for the In-Situ Regulation of Fuel Cells  
W. Strunz, I. Buder, ZAHNER-Messtechnik

10:10      Linear and Nonlinear Frequency Response Analysis for Direct Methanol Fuel Cell Electrodes  
Q. Mao, U. Krewer, R. Hanke-Rauschenbach, Max Planck Institute for Dynamics of Complex Technical Systems Magdeburg

10:30      **Coffee break, Exhibition**

**Session 2: Batteries**

11:00      Impedance Spectroscopy on half cells of lead-acid batteries with various reference electrodes  
H. Budde-Meiwes, T. K. Dung Tran, J. Kowal, D. U. Sauer, Institute for Power Electronics and Electrical Drives (ISEA), RWTH Aachen University

11:20      Modeling Li-Ion-Battery Ageing Data Utilizing Particle Swarm Optimization  
J. G. Roth, M. Slocinski, J.-F. Luy, Daimler AG Ulm

11:40      Time domain simulations of constant phase elements using IIR filter  
U. Tröltzsch, P. Büschel, O. Kanoun, Chair for Measurement and Sensor Technology, Chemnitz University of Technology

12:00      **Lunch break, Exhibition**

**Session 3a: Corrosion 1**

13:30      Effects of soil properties and triazole-based inhibitors on steel samples as studied with electrochemical impedance measurements  
R. Holze, Physical Chemistry, Department of Electrochemistry, Chemnitz University of Technology

14:00      What do we learn about anodized aluminum by using the Electrochemical Impedance Spectroscopy?  
M. Schneider, K. Kremmer, S. Weidmann, W. Fürbeth, Fraunhofer IKTS Dresden

**Session 3b: Circuits and Signals 1**

13:30      Scalable impedance spectroscopy: comparative study of sinusoidal and rectangular chirp excitations  
M. Min, P. Annus, T. Parve, R. Land, Department of Electronics, Tallinn University of Technology

14:00      Digital chirp signal processing for broadband impedance spectroscopy - practical considerations for fast measurements  
D. Trebbels, M. Jugl, D. Anselmi, R. Zengerle, HSG-IMIT Institut für Mikro- und Informationstechnik Villingen-Schwenningen

14:20	Oxide Formation and Reduction on Copper K. P. Rataj, M. M. Lohrengel, C. Hammer, Physical Chemistry, Heinrich- Heine-University Düsseldorf	14:20	Harmonic Controlled Excitation in Galvanostatic Impedance Spectroscopy M. Lelie, M. Kiel, D.U. Sauer, Institute for Power Electronics and Electrical Drives (ISEA), RWTH Aachen University
14:40	Micro-EIS on anodized TiAlV6-4 U. Langklotz, M. Schneider, A. Michaelis, Fraunhofer IKTS Dresden	14:40	Fast Impedance Measurements during Galvanization by Pulse Techniques C. Hammer, M. M. Lohrengel, M. Schramm, Physical Chemistry, Heinrich- Heine-University Düsseldorf
15:00	<b>Poster Session, Exhibition, Coffee Break</b>		
	<b>Session 4a: Corrosion 2</b>		<b>Session 4b: Circuits and Signals 2</b>
16:00	Characterization of thin duplex oxide layers on aluminum substrates by EIS O. Yezerska, M. Burchardt, P. Plagemann, Fraunhofer IFAM Bremen	16:00	Low-cost impedance spectroscopy for semiconductor gas sensors - a hardware concept M. Schüler, S. Darsch, P. Reimann, A. Schütze, Laboratory for Measurement Technology, Saarland University Saarbrücken
16:20	Magnetic field effect on hydrogen evolution activity of Ni-Mo electrodeposited coating O. Aaboubi, LACM - DTI, UFR Sciences Reims	16:20	Miniaturized low - cost Time-Domain-Reflectometer circuit for wideband impedance spectroscopy measurement applications D. Trebbels, M. Jugl, D. Anselmi, R. Zengerle, HSG-IMIT Institut für Mikro- und Informationstechnik Villingen-Schwenningen
16:40	Anticorrosion behavior of amorphous silicon based coatings prepared by remote cold plasma assisted chemical vapour deposition process A. Delimi, B. Talhi, F. Bentiss, S. Szunerits, C. Jama, University of Skikda, Algeria	16:40	Handheld impedance measurement platform for applications in biomedicine and technology M. Rist, T. Jaansoo, P. Annus, ELIKO Competence Center Tallinn
		17:00	Design and Evaluation of a Portable Device for the Measurement of Bioimpedance Cardiograph Q. Shi, O. Kanoun, Chair for Measurement and Sensor Technology, Chemnitz University of Technology
		17:20	Current source considerations for broadband bioimpedance spectroscopy P. Annus, M. Min, M. Rist, J. Ojarand, Department of Electronics, Tallinn University of Technology
19:00	<b>Special dinner</b>		

**Friday, October 15<sup>th</sup> 2010**

**Plenary Talk**

- 8:30 Impedance Spectroscopy of Planar Electromagnetic Sensors for Environmental Monitoring  
S. C. Mukhopadhyay, Massey University (Turitea), Palmerston North, New Zealand

**Session 5: Sensors**

- 9:15 Feature extraction based on impedance spectroscopy for semiconductor gas sensors  
T. Gillen, P. Reimann, A. Schütze, Laboratory for Measurement Technology, Saarland University Saarbrücken
- 9:35 Influence of Variations of Charge Carrier Densities on the Impedance Spectrum of Planar Chemosensors Involving Semiconducting Materials and Ion-blocking Interfaces  
A. Fischerauer, G. Fischerauer, Lehrstuhl für Mess- und Regeltechnik, Universität Bayreuth
- 9:55 Characterization of electromechanically active polymers using EIS  
I. Must, K. Kruusamäe, U. Johanson, T. Tamm, A. Punning, A. Aabloo, University of Tartu

10:15 **Poster Session, Exhibition, Coffee Break**

**Session 6: Biological and medical Applications**

- 11:00 Bioimpedance spectroscopy for real time monitoring of viable cells and 3D in vitro tissue models on multiwell microelectrode arrays  
A. Robitzki, H.-G. Jahnke, D. Krinke, S. Haas, O. Pänke, Centre for Biotechnology and Biomedicine (BBZ), University of Leipzig
- 11:30 Simulation of Continuous Spectroscopic Bioimpedance Measurements for Impedance Cardiography  
M. Ulbrich, J. Mühlsteff, M. Walter, S. Leonhardt, Chair for Medical Information Technology, RWTH Aachen University
- 11:50 Biological tissue classification for needle guidance - a fast impedance measurement method based on chirp signals  
D. Trebbels, M. Jugl, D. Anselmi, R. Zengerle, HSG-IMIT Institut für Mikro-und Informationstechnik Villingen-Schwenningen
- 12:10 Tissue Diagnostics using inductive impedance spectroscopy  
M. Heidary Dastjerdi, C. Sehestedt, J. Weidenmüller, C. Knopf, J. Himmel and O. Kanoun, Measurement Engineering and Sensor Technology, Hochschule Ruhr West

12:30 **Lunch break, Exhibition**

**Session 7: Local EIS and Interface Effects**

- 13:30 Combination of EIS and SVET for localized electrochemical measurements  
M.L. Zheludkevich, S. Kallip, A.C. Bastos, M.G.S. Ferreira, CICECO, DECV, University of Aveiro
- 13:50 Impedance measurements in AFM contact mode  
A. Zielinski, Department of Electrochemistry, Corrosion and Materials Engineering, Gdańsk University of Technology
- 14:10 Electrochemical behavior of Zinc-based organic coatings evaluated by Atomic Force Microscopy method  
K. Schaefer, Department of Electrochemistry, Corrosion and Materials Engineering, Gdańsk University of Technology
- 14:30 Interfacial capacitances at individual electrodes in glassy electrolytes  
J. Kruempelmann, C. Schober, C.R. Mariappan, B. Roling, Department of Chemistry, University of Marburg

14:50 **Closure**

15:15 **End of conference**

**List of Posters**

- 1 Monitoring the Initiation of Corrosion Phenomena in High Temperature Water Using Electrochemical Noise Measurements and Electrochemical Impedance Spectroscopy  
K. Csécs, T. Dorsch, S. Virtanen, AREVA NP GmbH
- 2 Effect of sulfide ions on corrosion behaviour of steel in a high chloride solution saturated with carbon dioxide  
Y. Louafi, M. A. Ladjouzi, Université des Sciences et Technologies Houari Boumédiène, Bab-Ezzouar, Algiers, Algeria
- 3 Electrochemical impedance spectroscopy of systems with low electrolytic conductivity  
F. Berthold, W. Vonau, Kurt-Schwabe-Institut für Mess- und Sensortechnik e.V. Meinsberg
- 4 Impedimetric biosensor for determination of cell viability on cell adhesion  
T. Frank, I. Tobehn, S. Nieland, A. Steinke, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH Erfurt
- 5 Investigation of Contacting Electrodes for Meat state Assessment  
M. Guermazi, I. Maximov, U. Tröltzsch, O. Kanoun, Chemnitz University of Technology
- 6 Development of a Computer Controlled Cell Chip System  
V. Charwat, G. Birnbaumer, P. Ertl, M. Joks, AIT- Austrian Institute of Technology
- 7 Label-free detection of DNA-ligand interactions by an impedimetric DNA sensor  
C. Witte, C. Tersch, F. Lisdat, Biosystems Technology, Wildau Technical University of Applied Sciences
- 8 Recent experiments at CiS (Center of intelligent Sensor technology) concerning CVD/ALD layer monitoring  
I. Tobehn, K. Hasche, M. Hintz, S. Völlmeke, A. Steinke, CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH Erfurt
- 9 Characterization of SiN Layers using impedance spectroscopy  
T. Keutel, C. Stöckel, T. Günther, O. Kanoun, Chemnitz University of Technology
- 10 Impedance Spectroscopy of Solar Cells  
V. Lange, D. Haas, M. Hepting, S. Straub, Hochschule Furtwangen

Program of the International Workshop on Impedance Spectroscopy 2010															
	8:00	9:00	10:00	11:00	12:00	12:30	13:00	14:00	15:00	16:00	17:00	18:00	19:00	19:30	
Wednesday 13th October	Registration	Tutorial 1	Tutorial 2	Tutorial 3	Lunch	Tutorial 4	Tutorial 5	Trip to Dresden							
Thursday 14th October	Regist.	Opening & Plenary	Fuel Cells	Coffee Break	Batteries	Lunch	Corrosion 1	Corrosion 2	Poster session	Free Time	Free Time	Free Time	Free Time	Special Dinner	
							Circuits and Signals 1	Circuits and Signals 2							
							Exhibition								
Friday 15th October	Regist.	Plenary	Sensors	Poster Session	Bio and Medicine	Lunch	Local IS & Interface Effects	Closure							
							Exhibition								