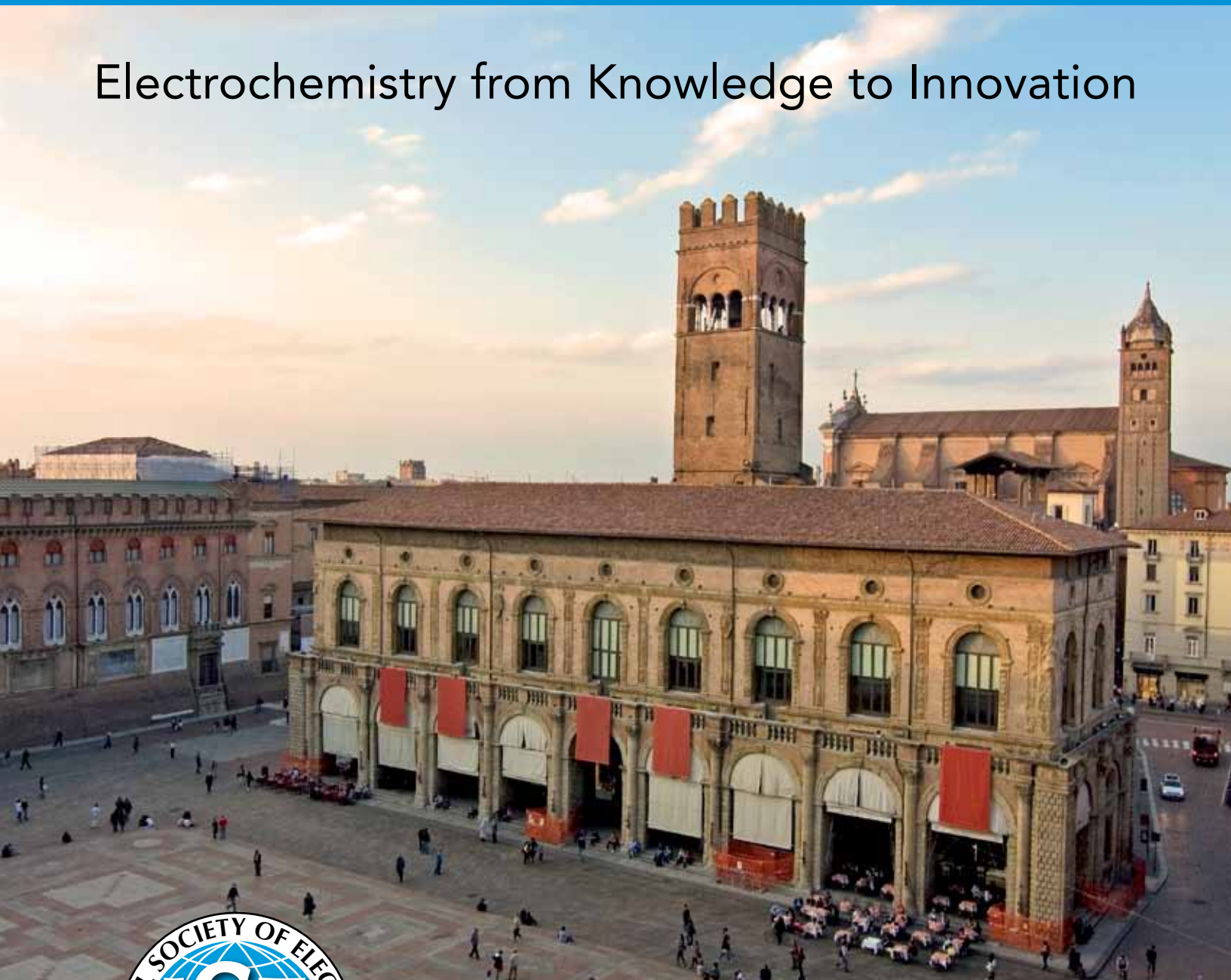


69th Annual Meeting

of the International Society of Electrochemistry

2 - 7 September 2018
Bologna, Italy

Electrochemistry from Knowledge to Innovation



2nd Announcement and - Call for Papers

<http://annual69.ise-online.org>

e-mail: events@ise-online.org



Organizing Committee

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Invitation to ISE 2018

You are warmly invited to the 69th Annual ISE Meeting to be held in Bologna, Italy, from 2 to 7 September 2018. The meeting will be hosted by the “Nuovo Polo Congressuale Bologna”. Bologna, seat of the oldest university in the western world, has been for centuries the place where academic knowledge is generated and transmitted throughout generations. Now the town is the centre of a vibrant, innovation-driven, high-tech area. To mark the continuity between academic culture and technological progress, the scientific theme of the meeting is Electrochemistry from Knowledge to Innovation. The scientific program of the 69th Annual Meeting will comprise symposia sponsored by all ISE Divisions, covering all the scientific interests of the ISE membership and of the electrochemical community at large. Fundamental aspects of analytical, molecular, physical and bioelectrochemistry will be discussed, as well as their applications to (nano)materials science, energy, environment and biomedicine.

Summary of Symposia

- Symposium 1: Nanomaterials for Electroanalytical Chemistry and Electroanalytical Tools for Studying Nanomaterials
- Symposium 2: Hyphenated-Techniques Incorporating Analytical Electrochemistry
- Symposium 3: Bioelectrochemistry Returns to the Home of Galvani
- Symposium 4: Bipolar Electrochemistry, from Bioanalysis to Materials Science
- Symposium 5: Photobioelectrochemistry - from Basic Concepts and Materials to Devices
- Symposium 6: Batteries into the Future: from Advanced Lithium-Ion Systems to Novel Chemistries and Architectures
- Symposium 7: Electrochemical Systems for Energy Conversion: Fuel Cells and Electrolysers
- Symposium 8: Supercapacitors: from Double-Layer Electrochemical Capacitors to Faradaic-Based High Power Systems
- Symposium 9: Photo-Electrochemical Energy Conversion: Symposium in Honor of Prof. Jan Augustynski
- Symposium 10: Materials *for* and *from* Electrochemistry: State of the Art and Future Trends
- Symposium 11: Corrosion, Passivation, and Protection Strategies
- Symposium 12: Electrophoretic Deposition of Functional Coatings: from Materials Science to Biotechnology
- Symposium 13: Electrochemistry Applied to Cultural Heritage
- Symposium 14: Electrochemical Engineering: Research towards Deployable Technology
- Symposium 15: New Trends in (Bio)-Molecular Electrochemistry
- Symposium 16: Micro- and Nano-Scale Platforms to Study Electron Transport in (Bio) Molecular Systems: from Fundamentals to Molecular Devices
- Symposium 17: Physical Electrochemistry: Recent Developments in Spectroscopy, Microscopy and Theory for the Rational Design of Electrochemical Interfaces
- Symposium 18: Theory: from Understanding to Optimization and Prediction
- Symposium 19: Single Entity Electrochemistry
- Symposium 20: Interfacial Electrochemistry in Non-Aqueous Electrolytes
- Symposium 21: General Session



2017 ISE Prize Winners and Award Lecturers

Frumkin Memorial Medal

Doron Aurbach, Bar-Ilan University, Ramat Gan, Israel

ISE-Elsevier Prize for Experimental Electrochemistry

Patrick Unwin, University of Warwick, UK

Katsumi Niki Prize for Bioelectrochemistry

Justin Gooding, University of New South Wales, Sydney, Australia

Alexander Kuznetsov Prize for Theoretical Electrochemistry

Michael Eikerling, Simon Fraser University, Burnaby, Canada

Jaroslav Heyrovsky Prize for Molecular Electrochemistry

Armando Gennaro, University of Padova, Italy

Tajima Prize

Xile Hu, Ecole Polytechnique Fédérale de Lausanne, Switzerland

Zhaowu Tian Prize for Energy Electrochemistry

Xiangfeng Duan, UCLA, Los Angeles, CA, USA

ISE Prize for Electrochemical Materials Science

Csaba Janaky, University of Szeged, Hungary

ISE-Elsevier Prize for Green Electrochemistry

Abdoulaye Thiam, Universidad Tecnológica Metropolitana, Santiago, Chile

ISE-Elsevier Prize for Applied Electrochemistry

Federico Bella, Politecnico di Torino, Italy

Early Career Analytical Electrochemistry Prize of ISE Division 1

Kristina Tschulik, Ruhr-University Bochum, Germany

Oronzio and Niccolò De Nora Foundation Young Author Prize

Jilei Liu, Nanyang Technological University, Singapore

Frumkin Memorial Medal

Doron Aurbach

Bar Ilan University, Israel



Doron Aurbach is a full professor in the department of Chemistry, leading the electrochemistry group (40 people), a senate member at Bar Ilan university (BIU), Israel. He chaired the department of chemistry during 2001-2005. He founded the electrochemistry group at BIU 32 years ago, 50 PhD and 70 MSc students received their degrees under his supervision since then.

His team studies the electrochemistry of active metals, non-aqueous electrochemical systems, develops spectroscopic methods (in situ and ex situ) for sensitive electrochemical systems, studies electrochemical intercalation processes, electrochemical water desalination, electronically conducting red-ox polymers and develop rechargeable high energy density batteries and EDL capacitors. D. Aurbach has published so far more than 560 peer reviewed papers, more than 30600 citations, H index of 88 (WOS, mid 2017), 25 patents, 19 chapters in books and presented his scientific work in hundreds of invited talks in international conferences. D. Aurbach is serving as a senior editor in the Journal of the Electrochemical Society (JES). He is a fellow of the ECS (2008), ISE (2010) and MRS (2012). He is the head of INREP: Israel national research center for electrochemical propulsion (founded in 2012, 22 research groups). He received the ECS battery Div. technology award (2005), the Israel vacuum society (IVS) and Israel chemical society (ICS) excellence prizes (2007, 2012), the Landau prize for research towards green energy (2011), the ECS battery Div. research award, the Kolthoff prize (2013) and the E.B. Yeager prize of the International Battery Association IBA (2014) a member of the European Academy (2015), recipient of the A.J. Bard Award of the ECS in 2017.

Tutorials



Tutorial 1

Computational Electrochemistry

Richard G. Compton, Oxford University, UK
Enno Kaetelhoeen, Oxford University, UK
Eduardo Laborda, University of Murcia, Spain

The teachers aim to teach students and post-docs to write their own programs to simulate voltammetry and other electrochemical experiments. The course is not about the usage of off-the-shelf commercial packages. The course will be built on the book *Understanding Voltammetry: Simulation of Electrode Processes* by R.G. Compton, E. Laborda and K.R. Ward, Imperial College Press, 2014.

Tutorial 2

Differential Electrochemical Mass Spectrometry (DEMS)

Helmut Baltruschat, University of Bonn, Germany
Zenonas Jusys, University of Ulm, Germany

It is our intention that students understand how a mass spectrometer is best coupled to an electrochemical cell. They should learn what the requirements for the vacuum system are, how corresponding electrochemical cells should look like and what kind of cell is best suited for which purpose. Examples will be treated on how quantitative data can be gained. Limitations of the method will also be discussed.

Tutorial 3

Impedance Spectroscopy for the Diagnostic of Electrochemical Energy Storage/Conversion Systems

Mark Orazem, University of Florida at Gainesville, USA

This course, based on the recent textbook, *Electrochemical Impedance Spectroscopy*, 2nd Edition, by M.E. Orazem, B. Tribollet, John Wiley & Sons, Hoboken, 2017, is intended for chemists, physicists, material scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes. Attendees will develop an understanding of the technique, how to develop models with physical significance, and how to use graphical and regression methods to interpret measurements. Examples will include aspects of electrochemical energy storage/conversion systems.

Plenary Lecturers

Steven Chu

Stanford University, USA



Steven Chu is the William R. Kenan, Jr., Professor of Physics and Professor of Molecular & Cellular Physiology in the Medical School at Stanford University. He has published over 275 papers in atomic and polymer physics, biophysics, biology, batteries, and holds 11 patents. Currently, he is developing new optical nanoparticle probes for applications in biology and biomedicine, exploring new approaches to lithium ion batteries, PM2.5 air filtration and other applications of nanotechnology.

Dr. Chu was the 12th U.S. Secretary of Energy from January 2009 until the end of April 2013. As the first scientist to hold a cabinet position and the longest serving Energy Secretary, he recruited outstanding scientists and engineers into the Department of Energy. He began several initiatives including ARPA-E (Advanced Research Projects Agency – Energy), the Energy Innovation Hubs, the U.S. – China Clean Energy Research Centers (CERC), and was personally tasked by President Obama to assist BP in stopping the Deepwater Horizon oil leak.

Prior to his cabinet post, he was director of the Lawrence Berkeley National Laboratory and Professor of Physics and Molecular and Cell Biology at UC Berkeley. Previously he was the Theodore and Francis Geballe Professor of Physics and Applied Physics at Stanford University. He helped launch Bio-X at Stanford University, a multi-disciplinary institute combining the physical and biological sciences with medicine and engineering, and the Kavli Institute for Particle Astrophysics and Cosmology. Previously he was head of the Quantum Electronics Research Department at AT&T Bell Laboratories.

Dr. Chu has dozens of awards including the 1997 Nobel Prize in Physics for contributions to laser cooling and atom trapping. He has 29 honorary degrees and is a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Academia Sinica, and is a foreign member of the Royal Society, the Royal Academy of Engineering, the Chinese Academy of Sciences, and the Korean Academy of Sciences and Technology.

Shelley Minteer

University of Utah, USA



Shelley Minteer is a USTAR Professor in both the Departments of Chemistry and Materials Science and Engineering at the University of Utah. She received her PhD in Analytical Chemistry at the University of Iowa in 2000 under the direction of Professor Johna Leddy. After receiving her PhD, she spent 11 years as a faculty in the Department of Chemistry at Saint Louis University before moving to the University of Utah in 2011. She is also an Associate Editor for the Journal of the American Chemical Society and the current President of the Society of Electroanalytical Chemistry. She has published greater than 250 publications and greater than 300 presentations at national and international conferences and universities. She has won several awards including the Luigi Galvani Prize of the Bioelectrochemical Society, the Missouri Inventor of the Year, International Society of Electrochemistry Tajima Prize, Fellow of the Electrochemical Society, and the Society of Electroanalytical Chemists' Young Investigator Award. Her research interests are focused on electrocatalysis and bioanalytical electrochemistry. She has expertise in biosensors, biofuel cells, and bioelectronics.

Plenary Lecturers

Marc Koper

Leiden University, Netherlands



Marc Koper is Professor of Surface Chemistry and Catalysis at Leiden University, The Netherlands. He received his PhD degree (1994) from Utrecht University (The Netherlands) with a thesis on nonlinear dynamics and oscillations in electrochemistry. He was an EU Marie Curie postdoctoral fellow at the University of Ulm (Germany) and a Fellow of Royal Netherlands Academy of Arts and Sciences (KNAW) at Eindhoven University of Technology, before moving to Leiden University in 2005. He was awarded with a Japan Society for the Promotion of Science (JSPS) Long-term Fellowship Award in 2011, with the Hellmuth Fischer Medal of the German Society for Chemical Technology (DECHEMA) in 2012, with the Carl Wagner Memorial Award of the Electrochemical Society in 2013, with the Brian Conway Prize for Physical Electrochemistry of the International Society of Electrochemistry in 2016, and with Faraday Medal of the Royal Society of Chemistry in 2017. He has been Fellow of the International Society of Electrochemistry since 2015. His main research interests are in fundamental aspects of electrocatalysis, theoretical electrochemistry, and electrochemical surface science.

Justin Gooding

University of New South Wales, Australia



Scientia Professor Justin Gooding is a Fellow of the Australian Academy of Science and is currently an ARC Australian Laureate Fellow and the co-director of the Australian Centre for NanoMedicine. He is also editor-in-chief of the journal ACS Sensors. He graduated with a B.Sc. (Hons) from Melbourne University before obtaining a D.Phil. from the University of Oxford and received post-doctoral training at the Institute of Biotechnology in Cambridge University. He returned to Australia in 1997 as a Vice-Chancellor's Post-Doctoral Research Fellow at the University of New South Wales (UNSW). He was promoted to full professor in 2006. He has won a number of awards including the Royal Australian Chemical Institute's medals for Analytical Chemistry, Electrochemistry and Excellence in Chemistry, the 2009 Eureka Prize for Scientific Research, the 2013 New South Wales Science and Engineering Award for Emerging Research, the 2016 Faraday Medal of the Royal Society of Chemistry Electrochemistry Division and the 2016 Biosensors and Bioelectronics Award. He leads a research team of 50 researchers interested in surface modification and nanotechnology for biosensors and bioelectrochemistry, biomaterials, electron transfer, electrocatalysis and nanomedicine.

Flavio Maran

University of Padova Italy



Flavio Maran is Professor of Physical Chemistry at the Department of Chemistry, University of Padova, where he leads the Molecular Electrochemistry and Nanosystems Group. He is also Research Professor at the Department of Chemistry at the University of Connecticut. He obtained his Doctoral Laurea Degree in Chemistry, Summa cum Laude, from the University of Padova in 1980. He has been Visiting Scientist or Professor at the National Research Council of Canada, University of Western Ontario, University of Sherbrooke, Utah State University, University of La Laguna, Temple University, Princeton University, Okayama University, and Kyoto University. He is the 1996 winner of the A. Mion Prize for Chemistry, has been a Fellow of the Japan Society for the Promotion of Science (in 2000 and 2013), and is the recipient of the 2014 Jaroslav Heyrovsky Prize for Molecular Electrochemistry awarded by the International Society of Electrochemistry. He is an editorial board member and acts as section editor for various scientific journals, an active reviewer for ACS, Wiley, Elsevier, and RSC journals, as well as funding agencies, and a regular organizer of symposia for the Electrochemical Society and the International Society of Electrochemistry. His mentor was the late Elio Vianello, one of the fathers of molecular electrochemistry. His current research interests include molecular electrochemistry, monolayer-protected metal clusters, electron transfer, monolayers and biomimetic membranes on electrodes, and electrochemical biosensors.



Symposium 1

Nanomaterials for Electroanalytical Chemistry and Electroanalytical Tools for Studying Nanomaterials

Sponsored by :
Division 1, Analytical Electrochemistry

The nano era has a growing effect on electroanalytical chemistry and electroanalytical tools can offer a lot to study nano-organized materials. Nanostructured materials can be used for example to modify electrode surfaces, be applied as nano sensors and at the same time be used as a means of studying electrocatalytic processes used in electroanalysis. This is now offering new opportunities for measuring lower concentrations in smaller volumes and with higher selectivity.

Naturally, the implementation of nanomaterials in electroanalytical chemistry is an inherently interdisciplinary field of research, which requires bridging between analytical, physical chemistry and synthetic approaches. Yet, the benefits of this combination and integration are colossal as it truly makes it possible to design electroanalytical probes on a molecular scale.

This symposium aims to bring together electrochemists involved in different aspects of nanotechnology and nanochemistry to explore the impacts of the nanoscale on electroanalytical chemistry and *vice versa* to study how electroanalytical chemistry can be utilized for studying nanomaterials.

Symposium Organizers

Daniel Mandler (Coordinator), The Hebrew University of Jerusalem, Israel (mandler@vms.huji.ac.il)

Shuping Bi, Nanjing University, China

Luigi Falciola, University of Milan, Italy

Luisa Torsi, University of Bari, Italy



Symposium 2

Hyphenated-Techniques Incorporating Analytical Electrochemistry

Sponsored by:
Division 1, Analytical Electrochemistry

The development of electroanalytical devices and methods in molecular and surface electrochemistry is closely related to advances of complementary *in-situ* spectroscopic and microscopic techniques, such as UV-Vis, infrared, fluorescence, Raman, SEM, TEM, AFM, etc. This combined approach provides a wealth of new information on structure changes and reaction pathways determining and/or taking place during electron transfer and other interfacial reactions. It constitutes the key to establish structure-property relationships. This symposium will gather contributions highlighting recent methodological and instrumental developments in the field, and those predicted to be important in the near future.

Symposium Organizers

Fethi Bedioui (Coordinator), Chimie ParisTech, France
(fethi.bedioui@chimie-paristech.fr)

Massimo Marcaccio, University of Bologna, Italy

Fabien Miomandre, ENS Cachan, France

Renato Seeber, University of Modena and Reggio Emilia, Italy



Symposium 3

Bioelectrochemistry Returns to the Home of Galvani

Sponsored by:
Division 2, Bioelectrochemistry

Bioelectrochemistry for energy conversion and storage:

- Bioelectricity
- Biocatalysis
- Biofuel cells
- Biosupercapacitors
- Biobatteries

Bioelectrochemistry for biosensors and bioelectronic devices:

- Biosensors
- Protein and DNA electrochemistry
- Experimental as well as theoretical and modeling of biological electron transfer systems and processes

Electrochemical methods in medical diagnosis:

- Detection of reactive oxygen and nitrogen species, oxidative stress based diseases and immune responses, cell signaling and communication
- Electrochemistry of disease targeted molecules and drug delivery systems
- Membrane protein electrochemistry
- Electrochemistry of biological and biomimetic membranes

Symposium Organizers

Wolfgang Schuhmann (Coordinator), University of Bochum, Germany (wolfgang.schuhmann@rub.de)

Fabiana Arduini, University of Rome Tor Vergata, Italy

Renata Bilewicz, University of Warsaw, Poland

Ilaria Palchetti, University of Florence, Italy



Symposium 4

Bipolar Electrochemistry, from Bioanalysis to Materials Science

Sponsored by:

Division 1, Analytical Electrochemistry

Division 2, Bioelectrochemistry

Division 4, Electrochemical Materials Science

The concept of bipolar electrochemistry has been known for several decades. However, with the advent of micro- and nanotechnology there is considerable renewed interest in this approach as it has become apparent that there are extremely attractive features of bipolar electrochemistry for completely new applications in areas ranging from analytical chemistry to materials science. The renaissance of this topic over the last ten years includes, among others, studies about:

- Electrochemical (bio)sensors and their arrays
- High throughput screening of electrocatalysts
- Controlled generation of surface gradients
- Synthesis of asymmetric particles
- Wireless generation of electrochemiluminescence
- Unconventional motion of small objects
- Photoelectrochemistry
- Corrosion studies

The symposium aims at giving an overview of the potential use of bipolar electrochemistry in very different areas and presenting directions for future evolution.

Symposium Organizers

Alexander Kuhn (Coordinator), University Bordeaux 1, France (alexander.kuhn@enscbp.fr)

Fredrik Björefors, Uppsala University, Sweden

Richard Crooks, University of Texas at Austin, USA

Paolo Ugo, University of Venice, Italy

Symposium 5

Photobioelectrochemistry - from Basic Concepts and Materials to Devices

Sponsored by:

Division 2, Bioelectrochemistry

Division 6, Molecular Electrochemistry

The symposium will deal with all aspects of photo-induced changes in electroactivity of biological systems. This includes the study of basic phenomena but also areas of application. The conversion of light into other forms of energy such as electrical or chemical energy has attracted considerable interest in recent years and thus, will be in the focus. Biological systems can serve as efficient examples for such conversions. Combining principles of photosynthesis and enzymatic catalysis with basic ideas of engineering and electrochemistry has already been demonstrated to contribute to recent advances. The symposium aims to bring together scientists from different areas who are working on different aspects of such bioinspired, biohybrid or biomimetic systems or on basic investigations clarifying the influence of light on electrochemical reactions. The scope of the symposium will include (but is not limited to):

- Photobioelectrodes
- Biohybrid solar cells & biovoltaics (including materials and cell design)
- Photo-bio-inspired mechanisms and biomimetic approaches
- Photobiocatalysis
- Photoelectrochemical fuel production (hydrogen, methanol, formate)
- Microbial electrochemistry of phototrophs and light-driven microbial electrosynthesis
- Triggering electrochemical conversions by light
- Plasmonic electrochemistry
- Photoelectrochemical sensing

Symposium Organizers

Fred Lisdät (Coordinator), Wildau Technical University, Germany (flisdät@th-wildau.de)

Danilo Dini, University of Rome La Sapienza, Italy

Lars Jeuken, University of Leeds, UK

Frank Marken, University of Bath, UK

Riccardo Ruffo, University of Milan Bicocca, Italy

Symposium 6

Batteries into the Future: from Advanced Lithium-Ion Systems to Novel Chemistries and Architectures

Sponsored by:
Division 3, Electrochemical Energy Conversion and Storage

Modern electronic devices, electric tractions and stationary applications are outlining the global battery market with limitless potential. These potentials are fulfilled only if breakthroughs in novel battery chemistries, nanostructured electrode materials architecture and safe electrolytes are appropriately integrated. If current and emerging issues such as combination of high-energy/power density with safety and low costs are specifically addressed, present and post lithium-ion batteries will revolutionize energy thirsty modern society. In such a scenario, this symposium is focused on recent progresses in the fundamental science related to secondary batteries, mainly advanced materials/components and novel chemistries targeting at safety and sustainability. Studies related to other (applied) aspects of batteries, including solid-state electrolytes, innovative designs and advanced characterisation techniques would also take a major share of the symposium. The topics include but are not limited to:

- Advanced Lithium batteries: materials and configurations
- Novel batteries chemistries different from lithium based ones (*Na, Mg, metal air*)
- Novel Flow-batteries
- Smart architectures and integrated systems

Symposium Organizers

Catia Arbizzani (Coordinator), University of Bologna, Italy
(catia.arbizzani@unibo.it)

Claudio Gerbaldi, Politechnic of Torino, Italy

Robert Kostecky, Lawrence Berkeley National Laboratory, USA

Stefano Passerini, Helmholtz Institute Ulm, Germany

Symposium 7

Electrochemical Systems for Energy Conversion: Fuel Cells and Electrolysers

Sponsored by:
Division 1, Analytical Electrochemistry
Division 3, Electrochemical Energy Conversion and Storage
Division 4, Electrochemical Materials Science

This Symposium includes but is not limited to fundamental and applied studies on functional materials and cell components (e.g., electrocatalysts, ionomers, electrolyte membranes/separators, gas diffusion layers, bipolar plates, etc.); characterization methods and modelling studies for all the different types of fuel cells and electrolysers. Contributions on the co-electrolysis of CO₂ and water to produce sustainable fuels are also welcome. This symposium covers studies on fuel cells, electrolysis and co-electrolysis devices for both low- and high-temperature applications. A summary of specific topics is reported in the following:

- Synthesis and characterisation of functional materials and cell components for fuel cells and water electrolysis systems for low- and high-temperature applications
- Novel electrocatalysts for oxygen reduction, electro-oxidation of hydrogen and organic fuels, oxygen evolution, and hydrogen evolution
- Electrolyte membrane/separators and ionomers for fuel cells, water electrolysis systems, and CO₂/water co-electrolysis systems: synthesis and characterization of polymeric, ceramic, ionic liquid and nanocomposite systems
- Improved understanding of electrochemical processes and new insights into the degradation of fuel cell and electrolyser components in low- and high-temperature applications
- *Operando* diagnostics/*in situ* characterization of fuel cells, water electrolysis systems, and CO₂/water co-electrolysis systems
- Theoretical studies and computational modeling of functional materials and cell components (e.g., electrocatalysts, ionomers, electrolyte membranes/separators, gas diffusion layers, bipolar plates, etc.)

Symposium Organizers

Vito Di Noto (Coordinator), University of Padova, Italy
(vito.dinoto@unipd.it)

Antonino Aricò, ITAE CNR Messina, Italy

Deborah Jones, University of Montpellier 2, France

Hiroyuki Uchida, University of Yamanashi, Japan



Symposium 8

Supercapacitors: from Double-Layer Electrochemical Capacitors to Faradaic-Based High Power Systems

Sponsored by:
Division 3, Electrochemical Energy Conversion and Storage

This symposium is devoted to recent progress on high-power electrochemical energy storage systems like supercapacitors. Studies on novel battery-like and pseudocapacitive materials as well as on high capacitance and novel nanostructured carbons, e.g. nanotubes and graphene, and new electrolytes are welcome. New concepts and new symmetric, asymmetric and hybrid devices for applications ranging from micro- to large-size energy storage, with attention to materials and system integration, will be included.

The topics include but are not limited to:

- Energy storage systems on the market: opportunities and challenges
- Hybrid energy storage systems: from pseudocapacitive towards battery-like materials
- Supercapacitor application and integration
- Sustainable precursors and processes and bio-inspired materials

Symposium Organizers

Francesca Soavi (Coordinator), University of Bologna, Italy
(francesca.soavi@unibo.it)

Andrea Balducci, Friedrich-Schiller-University Jena, Germany

Elzbieta Frackowiak, Poznan University of Technology,
Poland



Symposium 9

Photo-Electrochemical Energy Conversion: Symposium in Honor of Prof. Jan Augustynski

Sponsored by:
Division 2, Bioelectrochemistry
Division 3, Electrochemical Energy Conversion and Storage
Div. 5, Electrochemical Process Engineering and Technology
Division 6, Molecular Electrochemistry

This special symposium is dedicated to photo-electrochemical energy conversion. It includes but is not limited to fundamental studies of metal oxide electrodes for applications in semiconductor and/or plasmonic photocatalytic energy conversion systems and chemical sensors. The scope of the symposium comprises energy conversion processes through a combination of material(s) photoactivity and electrocatalytic specificity, leading to generation of fuels and/or activation of very stable organic molecules. Investigations of thin film semiconducting metal oxide materials, including various doped binary and ternary oxides with improved optical absorption properties, fast charge-transport and charge-transfer are primary focus areas of this symposium.

This symposium honors Prof. Jan Augustynski and his achievements in research, teaching, and collaborating with numerous students, postdocs and scientists from all over the world during his 50 year long academic career.

Symposium Organizers

Robert Kostecki, (Coordinator), Lawrence Berkeley National Laboratory, USA (r_kostecki@lbl.gov)

Federico Bella, Politecnico di Torino, Italy

Stefano Caramori, University of Ferrara, Italy

Clara Santato, Polytechnic of Montreal, Canada

Renata Solarska, University of Warsaw, Poland

John Turner, National Renewable Energy Laboratory Denver, USA

Symposium 10

Materials *for* and *from* Electrochemistry: State of the Art and Future Trends

Sponsored by:

Division 4, Electrochemical Materials Science
Division 6, Molecular Electrochemistry

Electrochemically synthesized and electroactive materials both owe their usefulness to the ability to harness redox processes, aimed however at different purposes: synthesis and functionality, respectively. Concepts and phenomena from one could thus be applied to the other, leading to potential synergies and novel insights: think for example of ion intercalation to generate new materials, or inducing functionality by accurately placing active sites. This symposium will cover the latest findings in the electrochemical synthesis of materials, the current status of electroactive materials, and examine the potential synergies derived by exploiting concepts from either. Contributions are welcome in, but not limited to, the following areas:

- New concepts in electrochemical synthesis and electrochemical surface treatment
- Next generation materials by electro-, electroless deposition, and electrochemical surface treatments
- Novel methods for atomic/nanoscale control of morphology and function
- Molecular understanding of additives
- Molecular, supramolecular and electrochemically active materials
- Conjugated and redox-active polymers
- Composite electroactive materials
- Nanostructured and functionalized surfaces
- Carbon nanostructures, e.g. carbon nanotubes, fullerenes and graphene, as well as other 2-dimensional materials such as black phosphorus or dichalcogenides

Symposium Organizers

Giovanni Zangari (Coordinator), University of Virginia, USA
(gz3e@virginia.edu)

Sandro Cattarin, ICMATE CNR Padova, Italy

Silvia Franz, Politechnic of Milan, Italy

Massimo Innocenti, University of Florence, Italy

Mikhail A. Vorotyntsev, Mendeleev University of Chemical Technology, Russia

Symposium 11

Corrosion, Passivation, and Protection Strategies

Sponsored by:

Division 4, Electrochemical Materials Science

The symposium will cover all aspects of corrosion science and engineering, such as corrosion mechanisms of advanced materials, corrosion processes in harsh and complex environments, passivity and oxide films, localized corrosion mechanisms, corrosion protection by coatings and inhibitors, as well as corrosion and protection in engineering applications. Contributions dealing with theoretical analysis, novel and exploratory electrochemical techniques to study corrosion phenomena, as well as surface analytical investigations on passive films and corrosion product layers are of interest. Research conducted at different length- and time-scales, in order to enhance understanding of corrosion from nanoscale initiation of localized attack to prediction of engineering failures, are most welcome.

Symposium Organizers

Sannakaisa Virtanen (Coordinator), University of Erlangen-Nuremberg, Germany (virtanen@ww.uni-erlangen.de)

Flavio Deflorian, University of Trento, Italy

Shinji Fujimoto, Osaka University, Japan

Philippe Marcus, ENSCP, France

Monica Santamaria, University of Palermo, Italy





Symposium 12

Electrophoretic Deposition of Functional Coatings: from Materials Science to Biotechnology

Sponsored by:

Division 4, Electrochemical Materials Science

The symposium is focused on the fundamentals and applications of the electrophoretic deposition (EPD) technique with emphasis on Direct Electrically-Driven Assembly processes for the development of coatings and functional films involving advanced particle assembly and packing strategies. The symposium will cover fundamentals and applications of electrophoretically deposited thick and thin films in several areas such as protective coatings, biomedicine, manufacturing of electro/photoactive, electro-mechanic and optical devices. Topics will include the fabrication of tailored coatings, films and multilayer structures with new functionalities in:

- Transportation and Communication
- Energy Conversion and Storage
- Health Care and Clean Technologies

In addition, contributions that address the *in situ* characterization of particle surface modification in liquid media, rheology, deposition ordering and kinetics will be considered, and papers which discuss mechanistic aspects of co-deposition will be particularly welcome.

Symposium Organizers

Aldo R. Boccaccini (Coordinator), University of Erlangen-Nuremberg, Germany (aldo.boccaccini@fau.de)

Begoña Ferrari, CSIS Madrid, Spain

Carmen Galassi, ISTECCNR Faenza, Italy

Symposium 13

Electrochemistry Applied to Cultural Heritage

Sponsored by:

Division 1, Analytical Electrochemistry

Division 4, Electrochemical Materials Science

Division 6, Molecular Electrochemistry

The physical part of the worldwide cultural heritage is deteriorating faster than it is being conserved, restored or studied. Assets are being lost, or are at risk, through natural processes of decay, environmental disasters, the direct effects of enhanced public access, lack of knowledge in conservation/preservation, and simple negligence. The conservation of cultural heritage is for these reasons both a culturally important activity in its own right and an economic need. A multidisciplinary team (i.e. art historians, archaeologists, curators, conservators, as well as analytical scientists, and other specialists at a basic research level) must be involved in solving this issue.

There are several applications of electrochemistry in this area: restoration of metallic objects from cultural heritage, the use of electrochemical techniques for authenticity purposes or contribute to the development of simple diagnostic techniques necessary for identifying practical conservation needs. Electrochemistry can be used in conservation science as an analytical approach in order to determine the composition of the materials forming the object and, eventually, the products of chemical alterations, adherence, materials incorporated in prior restorations, etc. or as restorative/conservation methods in order to preserve the original state of the piece and/or incorporate protective materials for ensuring its future conservation. Electroanalytical methods can be used for determining the composition of the environment around the object (atmosphere, waters, soils) in an archeological site and for monitoring the composition of the environment around monuments or objects preserved in museums, stores, etc.

A selection of papers from this symposium will be published in the Journal of Cultural Heritage, after peer review.

Symposium Organizers

Susana C. de Torresi (Coordinator), University of Sao Paulo, Brazil (storresi@iq.usp.br)

Christopher Brett, University of Coimbra, Portugal

Cristina Chiavari, University of Bologna, Italy

Kurt Kalcher, University of Graz, Austria

Ligia Moretto, University of Venice, Italy



Symposium 14

Electrochemical Engineering: Research towards Deployable Technology

Sponsored by:
Division 5, Electrochemical Process Engineering and
Technology

Electrochemical engineering contributions are encouraged on the conception, modelling, design, fabrication, performance characterisation, control and optimisation of prototype electrodes / electrocatalysts, electrochemical reactors and processes. Reports would be welcome addressing, though not exclusively: energy conversion and storage, novel water and soil treatment and other environmental protection processes, porous electrodes for capacitive deionization and other electrochemical processes, novel electrode materials and material protection processes, etc. The complexity of such systems may require computational predictions of their behaviour, using advanced mathematical modelling methods. Hence, such contributions would also be welcome, enabling focusing of experiments, aiding interpretation of experimental data and facilitating optimal design. The symposium will provide a forum to report recent developments and to discuss outstanding challenges.

Symposium Organizers

Karel Bouzek (Coordinator), University of Chemistry and Technology Prague, Czech Republic (bouzekk@vscht.cz)
Henry Bergman, Anhalt University, Germany
Maarten Biesheuvel, Wetsus Leeuwarden, Netherlands
Geoffrey Kelsall, Imperial College London, UK
Simonetta Palmas, University of Cagliari, Italy
Onofrio Scialdone, University of Palermo, Italy

Symposium 15

New Trends in (Bio)-Molecular Electrochemistry

Sponsored by:
Division 6: Molecular Electrochemistry

This symposium will cover all aspects of fundamental (bio)-molecular electrochemistry involving organic, organo-metallic, and coordination compounds to elucidate their electrochemical activity and thus fully exploit it, also designing new trends in applications.

The symposium will cover a broad range of topics including, but not limited to: mechanistic investigations, structure-activity relationships, molecular electrosynthesis, molecular electrocatalysis, molecules of biological interest, mimicking of active centres in biomolecules, electroactive molecules with innovative functional properties, molecular modification of surface by electrochemical activation, host-guest interactions, molecular recognition, multiple redox centers, spectro-electrochemistry. The purpose of this symposium is to bring together the leading scientists working in all the aspects of (bio)-molecular electrochemistry, in order to stimulate intensive discussions and initiate/improve collaborations within the electrochemical community.

Symposium Organizers

Olivier Buriez (Coordinator), Ecole Normale Supérieure Paris, France (olivier.buriez@ens.fr)
Christian Durante, University of Padova, Italy
Jiri Ludvik, J. Heyrovsky Institute Prague, Czech Republic
Patrizia Mussini, University of Milan, Italy



Symposium 16

Micro- and Nano-Scale Platforms to Study Electron Transport in (Bio)Molecular Systems: from Fundamentals to Molecular Devices

Sponsored by:

Division 2, Bioelectrochemistry

Division 6, Molecular Electrochemistry

Division 7, Physical Electrochemistry

This symposium intends to gather scientists working within the expanding community of (bio)molecular electronics and related fields, who routinely exploit electrochemical-like approaches in nano- and micro-scale platforms. The symposium will cover all aspects of electron transfer in molecular or biomolecular moieties that profit from an electrified interface and where the electrochemical control has or could find an essential role. In order to put together researchers with very distinct perspectives of molecular electron transfer, the symposium will target studies that range from fundamental approaches, including single-molecule or nanoscale platforms (e.g. SPM approaches, EGain, nanoscale junctions, nanotubes/graphene interfaces, etc.) and computational modelling, to micro-scale molecular junctions involving hybrid micro/nano-structured materials for device applications. Such wide vision of this topic will be achieved by attracting researchers interested on different aspects of molecular electron transport, namely, from physical mechanisms and structural aspects of it, to those interested on potential applications such as molecular transistors, (bio)molecular sensors, sequencing platforms, etc.

Symposium Organizers

Ismael Díez-Pérez, (Coordinator), University of Barcelona, Spain (isma_diez@ub.edu)

Sabrina Antonello, University of Padova, Italy

Angel Cuesta Ciscar, University of Aberdeen, UK

Nadim Darwish, Curtin University, Australia

Giovanni Valenti, University of Bologna, Italy

Symposium 17

Physical Electrochemistry: Recent Developments in Spectroscopy, Microscopy and Theory for the Rational Design of Electrochemical Interfaces

Sponsored by:

Division 7, Physical Electrochemistry

The electrode-electrolyte interface defines the performance of diverse electrochemical devices with applications related to energy (conversion, production and storage), water (purification and remediation), (bio-)chemical sensing, environmental and process monitoring, surface protection, optical displays and electronics. Fabrication of optimized interfacial architecture and functionality for a given application requires the ability to control and determine interfacial composition and the interactions between the system components at a molecular level. Recent advances that combine electrochemical methods with in situ/operando spectroscopy, electrochemical scanning probe microscopy, synchrotron-based techniques and theoretical calculations provide a detailed picture of the electrochemical interface at the atomic and molecular level. These lead to an understanding of the structure-reactivity and structure-selectivity relationships that dictate electrochemical reaction mechanisms and kinetics. These are crucial to the design and exploitation of improved materials. This symposium will cover recent developments in experimental and theoretical methods for the understanding and rational design of electrode surfaces, from model electrodes to novel nanostructured electrocatalysts and functional materials.

Symposium Organizers

Robert Hillman (Coordinator), University of Leicester, UK (arh7@le.ac.uk)

Maria Escudero-Escribano, University of Copenhagen, Denmark

Alessandro Minguzzi, University of Milan, Italy

Piercarlo Mustarelli, University of Pavia, Italy

Symposium 18

Theory: from Understanding to Optimization and Prediction

Sponsored by:

Division 7, Physical Electrochemistry

Co-sponsored by the Electrochemical Society



Theory and computational electrochemistry give the promise of achieving both a greater fundamental understanding or characterization of experiments and a prediction of the properties and performance of new electrochemical devices prior to experiment. Based on the advantage of limited cost, they aim to foster the innovation like both fundamental and technology breakthroughs. This symposium aims at coupling aspects of physical electrochemistry to elements of electrochemical engineering, in particular through the use of simulation techniques in strong connection with experimental characterization for validation.

Following topics will be considered:

- Using simulation techniques such as *ab initio* calculations, molecular dynamics, dissipative particle dynamics, kinetic Monte Carlo, Continuum Fluid Dynamics, multi-physics and/or multiscale computational approaches for understanding and for the optimization and design of electrochemical cells
- Design of experimental validation techniques
- Methods for determination or estimation of parameters entering the computational models
- Comparison and correlation of behaviors and properties obtained at various scales and using different computational techniques
- Applications include: charge transfer processes, electrochemical interfaces, electrocatalysis, porous electrodes, photo-electrochemical cells, electrochemical cells for energy storage and conversion (batteries, supercapacitors, fuel cells, electrolyzers)

Symposium Organizers

Alejandro A. Franco (Coordinator), Université de Picardie Jules Verne, France (alejandro.franco@u-picardie.fr)

Marc Koper, Leiden University, Netherlands

Pawel Kulesza, University of Warsaw, Poland

Claudio Fontanesi, University of Modena and Reggio Emilia, Italy

Fabio La Mantia, University of Bremen, Germany

Petr Vanysek, Northern Illinois University, USA

Symposium 19

Single Entity Electrochemistry

Sponsored by:

Division 1, Analytical Electrochemistry

Division 2, Bioelectrochemistry

Division 7, Physical Electrochemistry

Single entity electrochemistry is an important and rapidly growing theme in electrochemistry. It deals with the electrochemical properties of individual molecules, nanoparticles and nanotubes, the use of nanopores and nanopipettes for the detection of biomolecules and single particles, and the study of complex surfaces and single cells at the level of elementary processes and individual surface features.

This new area of electrochemistry thus unifies a wide range of important topics, from electrocatalysis at the (sub-) particle level to bioanalysis (e.g., single cell studies and DNA analysis), bringing together underlying concepts, principles and experimental and theoretical challenges that are common. Significant issues for measurements in this area include the detection and analysis of small (pA - fA), and transient, current signals and the treatment of very large data sets. Further, the interpretation of single entity electrochemistry experiments requires theoretical descriptions that go beyond continuum models for mass transport and reactivity, and consideration of interfacial properties (charge density, double layer, structure, composition, defects etc.) at the nanoscale. There are opportunities for significant advances through the use of *in-situ* and *operando* spectroscopy and microscopy methods together with electrochemistry. This symposium will provide a vibrant forum to discuss this area of electrochemistry, bringing together experimentalists and theoreticians across several divisions to discuss a topic that is at the forefront of fundamental electrochemistry and underpins many important technical applications.

Symposium Organizers

Pat Unwin (Coordinator), University of Warwick, UK (p.r.unwin@warwick.ac.uk)

Paolo Actis, University of Leeds, UK

Damian Arrigan, Curtin University, Australia

Stefania Rapino, University of Bologna, Italy



Symposium 20

Interfacial Electrochemistry in Non-Aqueous Electrolytes

Sponsored by:

Division 3, Electrochemical Energy Conversion and Storage
Division 7, Physical Electrochemistry

Much less attention than to the electrode / aqueous electrolyte interface has been paid to the interface between an electrode and a non-aqueous electrolyte. The latter, however, has become very important in the context of high energy batteries and supercapacitors. Properties can be largely varied by changing the solvent molecules. Moreover, metal deposition from ionic liquids has become interesting for less noble metals. However, fundamental studies of such interfaces are often hampered by the typically limited cleanliness, leading also to a limited reproducibility. In this symposium, recent advances in the experimental characterization, theoretical description and understanding of such interfaces shall be discussed. To what extent are models, which are usually used for aqueous systems, suited for the description of non-aqueous systems? Which physical and chemical properties of a solvent play a role in the characteristics of the double layer and the charge transfer rate? In particular, such topics for non-aqueous electrolytes (including ionic liquids and solid-state ion conductors) could involve:

- Adsorption processes
- Double layer capacitance
- Electrodeposition
- Processes at model surfaces (e.g. single crystal electrodes)
- Charge transfer rates and mechanisms
- Structural characterization (by spectroscopy or scanning probe techniques)
- Electrocatalysis in non-aqueous systems
- Stability of electrolytes

Symposium Organizers

Helmut Baltruschat (Coordinator), University of Bonn, Germany (baltruschat@uni-bonn.de)

Nuria Garcia-Araez, University of Southampton, UK

Alessandro Lavacchi, ICCOM CNR Florence, Italy

Maria Assunta Navarra, University of Rome La Sapienza, Italy

Symposium 21

General Session

Sponsored by:

All Divisions

This Symposium will cover all ISE areas not compatible with topical symposia.

Symposium Organizers

Bernard Tribollet (Coordinator), LISE CNRS Paris, France, (bernard.tribollet@upmc.fr)

Daniel Belanger, Université du Québec Montreal, Canada

Hua Cui, University of Science and Technology Hefei, China



General Information

Venue

The “Nuovo Polo Congressuale Bologna” is a modern and functional congress centre equipped with the latest generation technological systems. Conveniently located near the important Bologna Exhibition Centre, north of the city centre, it is easily reached by public transportation. Bologna, a prestigious seat of learning, is the home of the oldest university in Europe, Alma Mater Studiorum, founded in 1088. Bologna, the capital of the Emilia-Romagna Region, is one of the most attractive Italian cities. Its old town centre, still intact in its medieval layout, is one of the best preserved in the world. Bologna is renowned for its friendly atmosphere, joie de vivre and haute cuisine. Piazza Maggiore, the very heart of the town, is surrounded by historical monuments including Palazzo d’Accursio, the former city’s Town Hall, the 13th century’s Palazzo Re Enzo and the San Petronio Basilica. In summer, it becomes the backdrop for cultural events and artistic performances. Major tourist attractions, like Venice, Florence, Milan and Rome, are easily and rapidly reached from Bologna by train.

Accommodation

Bologna offers a wide range of hotels of all categories, as well as easy access to cheap accommodation solutions at university residences and youth hostels, with an overall accommodation capacity exceeding 8,000 rooms.

Travel

Strategically placed, Bologna is a natural crossroads for international business and commerce. Its International airport “Guglielmo Marconi” is directly connected to most European cities and several intercontinental destinations. Bologna is a major road and railway hub, extremely well connected with all Italian centres, being at the junction of the main motorways and railways of the country. The railway station of Bologna is undergoing major renovation works to become one of the most important hubs for the high-speed system.

Climate

Bologna enjoys a temperate climate, although in summer it may be subject to steamy heat. September is the ideal month for visiting Bologna, with average temperatures of 15°/25°C.





Important Dates and Deadlines

Opening date for abstract submission: 15 December 2017

Deadline for abstract submission: 20 March 2018

Conference begins: 2 September 2018

Call for Papers

Authors are invited to submit a one page abstract in English, including figures, tables and references. Abstracts must be submitted online through the ISE website. The site will open for submission of abstracts on 15 December 2017. The closing date for submission of abstracts will be 20 March 2018. For details please refer to the ISE website.

Electrochimica Acta

A special issue of the Society's journal, *Electrochimica Acta*, is planned based on selected original contributions made at the conference. Selection will be made by an international Editorial Committee comprising a Guest Editor for each symposium, appointed and co-ordinated by the Special Issues Editor.

