

ISE - Division 2 - BIOELECTROCHEMISTRY

Report 2009

- **Topics**

Aspects of electrochemistry and electroanalysis characterizing biological processes at the molecular level and relevant to the mechanisms of biological regulation of cells.

- **Members: 641 (602 2008)**

- **Division officers**

Chair: Lo Gorton, Past Chair: Wolfgang Schuhmann, Chair Elect: Alexander Kuhn, Vice-Chairs: Woonsup Shin and Evgeny Katz

- **Divisional Meeting**

In order to improve the activity of our division and to discuss future activities a divisional lunch meeting was held on Thursday 20 Aug., 2009, in Beijing Division 2, Luncheon Meeting 12:30 to 13:45, Room 313, 3rd Floor, Lee Shau Kee Building. Several topics were discussed including the way of establishing a closer contact with the members, especially students. In this respect the decision has been made to serve as a pilot division for testing a new type of presentation in the forthcoming symposia of the division. 10 min talks will be scheduled that are devoted to student presentations and the presenting students may benefit from some financial support in order to assist them with covering the travel costs.

- **Activities at Annual Meetings**

60th Annual Meeting, Beijing, China, 2009

Symposium 1: From Single Biomolecule Electrochemistry to Biosensors and Biofuel Cells

Symposium organizers: Lo Gorton, (Coordinator) Lund University, Sweden, Huangxian Ju, Nanjing University, China, Wolfgang Schuhmann, Ruhr-University, Germany, Woonsup Shin, Sogang University, Seoul, Korea, Xiu-Rong Yang, Changchun Institute of Applied Chemistry, CAS, China

- **Activities for future ISE meetings.**

61th Annual Meeting, Nice, France, 2010

Symposium 3. Bioelectrochemistry.

Sponsoring Division: Division 2, Bioelectrochemistry

From fundamentals to applications with a special focus on nanostructured material

This symposium includes all general aspects of bioelectrochemistry but will be especially focused on the generation, the study and the use of nanostructured materials incorporating biological elements for applications ranging from electrochemical sensing to energy transformation purposes. Contributions might also address topics bordering neighboring disciplines such as spectroscopy, near field microscopy or protein engineering.

Topics include but are not limited to:

- Interfaces modified with electroactive biological species
- New strategies for patterning electrode surfaces with enzymes, organelles, cells and biomimetic systems
- Tailored protein structures for enhanced kinetics and selectivity
- Coupling of bioelectrochemistry with other techniques (EQCM, SPR, SERS ...)
- Fundamental investigations concerning bioelectrochemical energy transformation
- Interfacial design for bioelectrochemical microsensing

Symposium organizers: Lo Gorton, (Coordinator) Lund University, Sweden, Alexander Kuhn, University of Bordeaux, France, Woonsup Shin, Sogang University, Seoul, Korea, Christophe Innocent, CNRS, Montpellier, France

Symposium 11. Sensors and biosensors

Sponsoring Divisions: Division 1, 2 and 4

This symposium aims to present a broad overview on developments in electrochemical sensors. Thus it covers fundamental approaches which can lead to a better understanding of electroanalytical and bioelectrochemical sensing systems, new sensor architectures but also applications in medicine, industry and environmental monitoring.

Two aspects of modern sensor research will be given special attention: The first focus will be on all problems of in vivo sensing. This is an important area in medicine with increasing needs. However until now only few commercialisations have been seen. Thus the symposium wants to discuss the perspectives and current problems. The second focus is on miniaturisation down to the nanoscale and on techniques for the characterisation of these sensorial nanostructures. With this the symposium wants to follow the actual developments in methods of nanostructure preparation, their application in sensors and the better understanding of their properties.

Thus the symposium will include following topics:

- Examples of in vivo sensing
- Calibration strategies for in vivo sensor application and materials issues
- Miniaturization of sensing structures
- Imaging techniques for sensor surface characterization (eg. STM, AFM, SECM)
- Application of nanostructures
- Nanobiochips
- New sensor concepts
- Biomimetics

Symposium organizers

Fred Lisdat, (Coordinator) Wildau University, Germany, Wolfgang Schuhmann, Ruhr-Universitaet Bochum, Germany, Alexander Vaskevich, Weizmann Institute of Science, Israel, Alain Walcarius, University of Nancy, France, Féthi Bédioui, ENSCP, Paris, France

Symposium 14. Enzymes and Microbes for Energy Production in Biofuel Cells and Microbial Fuel cells

Sponsoring Divisions: Division 2, Bioelectrochemistry and Division 3, Electrochemical Energy Conversion and Storage

This symposium focuses on how enzymes and microorganisms can be used as biological catalysts in fuel cells for the production of clean energy and other applications. This research field is highly multidisciplinary and encompasses both fundamental issues and clearly claimed ambitious applicative goals. It is expected that this forum will bring together contributions from a diverse range of specialists involved in this kind of research such as bioelectrochemists, biochemists, microbiologists, plant physiologists, environmental and electrochemical engineers, fuel cell specialists and others, for a fruitful exchange of ideas and productive debates.

Topics will include:

- Current approaches for the wiring of enzymes to electrodes: surface engineering, immobilization techniques, physical and chemical stability with time, redox mediators and polymers, enzyme and substrate diversity, type of surface, direct electron transfer, etc.
- Electron transfer mechanisms between microorganisms and electrodes: membrane-bound compounds, naturally secreted redox mediators, conductive pili, structure of electro-active biofilms, electrochemical mechanisms in complex microbial populations, etc.
- Energetics of biofuel cells and microbial fuel cells: modelling, limits, power output estimates
- Applications of biofuel cells and microbial fuel cells: medical, electronics, sensing, water treatment, electrosynthesis, hydrogen production, power production.
- Challenges and future for biofuel cell and microbial fuel cells: limitations, bottlenecks, sustainability, new avenues (use of plants, eukaryotes, microbial cathodes, etc.).

Symposium organizers

Frédéric Barrière, (Coordinator) Université de Rennes 1, France

Alain Bergel, CNRS Toulouse, France

Evgeny Katz, Clarkson University, Potsdam, USA

Martin Winter, University of Muenster, Germany

62nd Annual Meeting, Niigata, Japan, 2011

For this meeting the division plans to organize two symposia in agreement with the local organizing committee :

Symposium 1

Bioelectrochemistry for Environmental Applications and Health monitoring

Organizers from the division : Woonsup Shin (+ another name to be confirmed)

Local Organizers: Tadashi Matsunaga, Hideaki Matsuoka

Symposium 2

Bioelectrochemistry for Energy Transformation

Organizers from the division: Evgeny Katz (+ another name to be confirmed)

Local Organizers: waiting for suggestion

• **Organization of future Spring Meetings**

Participation of Division 2 in spring meetings will be in 2013 when a spring meeting on bioelectrochemistry will be organized by W. Schuhmann in Bochum. This meeting will be organized in cooperation between the ISE and the Bioelectrochemical Society (BES) as a joint meeting.

• **Sponsored Meetings**

- a) **XXth Symposium of the International Society of Bioelectrochemistry**, Sibiu, Romania, May 2009 (www.biophysicsnet.ro). 1000 €. The money should be used to support participation by young scientists from less privileged countries.
- b) **6. Deutsches BioSensor Symposium**. Freiburg, Germany, March 29 – April 1, 2009, 500 € which should be used to support participation of young scientists.
- c) **4th International Workshop on Surface Modification for Chemical and Biochemical Sensing, SMCBS**, Nov. 6-10, Przegorzaly, Poland, 2009. 500 € which should be used to support participation of young scientists.

Katsumi Niki Prize for Bioelectrochemistry 2009: awardee **Serge Cosnier**

Award Committee: Lo Gorton, Woonsup Shin, Evgeny Katz, Ernesto Calvo, Alan Bond