

ISE - Division 2 - BIOELECTROCHEMISTRY

Annual Report December 2011

by Alexander Kuhn (Chair)

• **Members:** 515 in good standing

• **Division officers**

Chair: Alexander Kuhn, **Past Chair:** Lo Gorton, **Chair Elect:** Evgeny Katz,

Vice-Chairs: Woonsup Shin and Elena Ferapontova

• **Divisional Meeting**

The division had its traditional divisional lunch meeting at the occasion of the annual ISE meeting in Niigata on Thursday 15 September 2011. Several topics were discussed, including the format of the bioelectrochemistry symposia (special student talks, poster prizes, Facebook page etc...).

• **Activities at the Annual Meeting in Niigata in 2011**

At this annual meeting the division has organized two symposia:

Symposium 4: Bioelectrochemistry for Environmental Applications and Health Monitoring

Woonsup Shin (Coordinator), Sogang University, Korea
Fred Lisdat, Wildau University, Germany
Tadashi Matsunaga, Tokyo University AT, Japan
Hideaki Matsuoka, Tokyo University AT, Japan

This symposium focused on fundamentals and applications of bioelectrochemistry in helping our environment and health. Electrochemistry plays a key role in monitoring important species in environmental and biological fluids. Bioelectrocatalysis is a main concept in conversion of materials and energy in environmental and biological system. The symposium was the main symposium of the Bioelectrochemistry Division and also covered all general aspects of bioelectrochemistry.

Symposium 5: Bioelectrochemistry for Energy Transformation

Marcin Opallo (Coordinator), Polish Academy of Science, Poland
Lo Gorton, Lund University, Sweden
Kenji Kano, Kyoto University, Japan
Evgeny Katz, Clarkson University, USA

This symposium focused on all aspects of bioelectrochemistry related to energy conversion. This is because electrode reactions catalysed by enzymes or microorganism play important roles in conversion of chemical to electrical energy. Biomolecules are also promising fuels for electrochemical energy sources. Electrochemical methods are already well established tools for the studies of energy conversion in living organisms. This research area is highly multidisciplinary. It includes fundamental

issues and sets ambitious applied goals. The symposium brought together contributions from a diverse range of specialists and allowed a fruitful exchange of ideas and productive debates.

We were able to attract a wide range of high quality keynote and invited lecturers for both symposia:

Symposium 4

Kazuhito Hashimoto, Christophe Leger, Eiichi Tamiya, David H. Waldeck, Renata Bilewicz, Taek Dong Chung, Alison Downard, Jenny Emneus, Chenzhong Li, Elisabeth Lojou, Jyh-Myng Zen

Symposium 5:

Keith Baronian, Jurg Keller, Tokuji Ikeda, Isao Taniguchi, Plamen Atanassov, Nicolas Mano, Matsuhiko Nishizawa, Fred Lisdat, Shelley Minter, Serge Cosnier, Shaojun Dong, Sergey Shleev, Lanqun Mao

Furthermore there were special slots for oral presentations from PhD students and we organized in both symposia a poster award competition with a total of six poster prizes (300 euros each, see list of winners at the end of the document).

• Activities at the Annual Meeting in Prague in 2012

For this meeting the division has proposed to organize two symposia:

Symposium 1

Electrochemistry meets biology: fundamental aspects of electrochemistry with biological systems

Sponsored by: Division 2, Bioelectrochemistry

This symposium focuses on fundamentals of electron transfer pathways and mechanisms within and between biological systems and electrodes. Electron transfer reactions play a key role in biology and for a deeper understanding of such reactions and the successful applications of biological systems in analysis, medicine, energy conversion, and other areas.

This symposium of the Bioelectrochemistry Division also covers all general aspects of bioelectrochemistry.

Symposium Organizers

Elena Ferapontova (Coordinator), Interdisciplinary Nanoscience Centre, Aarhus University, Aarhus C, Denmark, (elena.ferapontova@inano.au.dk)

Taek Dong Chung, Seoul National University, Korea

Lo Gorton, Lund University, Lund, Sweden

Miroslav Fojta, Academy of Sciences, Brno, Czech Republic

Symposium 2

Advanced materials design for bioelectrochemical applications: from biosensors to biofuel cells

Sponsored by: Division 2, Bioelectrochemistry

Nanostructured electrode materials and sophisticated electrode architectures integrating biological elements are key factors for the successful development of state-of-the-art devices with optimized performance for applications ranging from biosensors to biofuel cells. Therefore this symposium focuses primarily on the rational design of electrode materials and surfaces for the study of fundamental and applied aspects in the broad field of bioelectrochemistry.

Alexander Kuhn (Coordinator), Université de Bordeaux, Bordeaux, France, (kuhn@enscbp.fr)

Evgeny Katz, Clarkson University, Potsdam, NY, USA

Woonsup Shin, Sogang University, Seoul, Korea

Wolfgang Schuhmann, Ruhr University Bochum, Bochum, Germany

Jiri Barek, Charles University, Prague, Czech Republic

For these two symposia the following keynote lecturers have been invited:

Symposium Electrochemistry meets biology: fundamental aspects of electrochemistry with biological systems.

Chunhai Fan, Michael Hill, Lars J.C. Jeuken, Julea Butt, Alan Bond

Symposium Advanced materials design for bioelectrochemical applications: from biosensors to biofuel cells.

Scott Calabrese Barton, Taek Dong Chung, Alexander Bittner

• Activities at the Spring Meeting in Bochum in 2013

Division 2 is in regular close contact with the organizers of the meeting and the officers of the Bioelectrochemical Society to prepare this joint meeting.

Potential topics of the meeting, that are at the moment under discussion, are the following:

1. Microelectrochemistry at cells and tissues
2. Enzymatic and microbial biofuel cells
3. Bioelectrochemistry: Design of the interface between biological recognition elements and electrodes including new tools and measuring techniques (fundamentals)
4. Bioassays, biochips, biosensors: New developments and applications
5. Interdisciplinary bioelectrochemistry: Bioelectrochemistry as a part of hyphenated techniques; new developments from other fields with impact on bioelectrochemistry

• Sponsorship of other meetings

As in the preceding years, division 2 has agreed to sponsor also in 2011 a couple of other meetings that are organized around topics related directly or indirectly to bioelectrochemistry:

1. **BES 2011**. XXI International Symposium on Bioelectrochemistry and Bioenergetics, will be held in Cracow, Poland, 8-12 May, 2011. 1000 € which were used for the participation of PhD students.
2. “Symposium on Biosensors”, **43rd IUPAC World Chemistry Congress 2011**, July 30- August 7, 2011, San Juan, Puerto Rico. 500 € which has been used to support the participation of young scientists.
3. 5th International Workshop on Surface Modification for Chemical and Biochemical Sensing, **SMCBS**, Nov. 4-8, Gdansk, Poland, 2011. 1000 € which has been used for the participation of PhD students.

• Awards

The **Katsumi Niki Prize** for Bioelectrochemistry of ISE is awarded every two years to a scientist who has made an important contribution to the field of bioelectrochemistry. For the 2011 edition of the award the selection committee has chosen **Prof. Wolfgang Schuhmann** as the winner of the award. He has been a major contributor to the field over the last two decades, with work covering a wide range of areas in bioelectrochemistry including studies of amperometric enzyme electrodes, immobilisation of redox enzymes in electropolymerised films and applications of SECM in bioelectrochemistry. His work stands out in terms of its scientific quality, and through his enthusiastic scientific engagement in the field he has managed to establish a real “scientific school” by helping his former students and post-docs to disseminate and to create their own groups. For all these reasons Professor Schuhmann is the most deserving recipient of this year’s Katsumi Niki Award in Bioelectrochemistry, and the award also recognizes a very active and dedicated ISE member who highly contributed and continues to contribute to the activities and the scientific reputation of the Society.

• Other activities

Bioelectrochemistry Divison

Best Poster Prizes 2011 at the Annual Meeting in Niigata

Mariwo Ikeuchi (Department of Environmental Biology and Chemistry, Graduate School of Science and Engineering for Research, University of Toyama, Toyama, Japan)

One-step Binding Assay by Magnetic Microbead-based Sequestration Electrochemistry for Cholera Toxin

Ming Soon Cheng (Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University, Nanyang Link, Singapore), Jia Shin Ho, Binh T. T. Nguyen, Chee-Seng Toh

A Membrane-based Electrochemical Nanobiosensor for Microbes Detection

Yoshihiko Nonaka (Department of Biotechnology & Life Science, Tokyo University of Agriculture and Technology, Koganei, Japan), Atsuro Tatsumi, Takahiro Hukaya, Koji Sode, Kazunori Ikebukuro

In silico maturation of VEGF-binding aptamer for electrochemical VEGF-detection system with aptamer Sandwich

Seiya Tsujimura (Graduate School of Agriculture, Kyoto University, Kyoto, Japan), Masafumi Asahi, Osamu, Shirai, Kenji Kano

Oxygen biocathode using protein-engineered multicopper oxidases

Division Facebook page

Thanks to the help of Martin Jönsson-Niedziółka from the Institute of Physical Chemistry, Polish Academy of Sciences our division has since October 2011 its own FACEBOOK page (<http://www.facebook.com/pages/ISE-Division-2-Bioelectrochemistry/156450904449193>). Please don't hesitate to use this page to communicate with other members, post your advertisements for open positions, conferences etc....

• Budget

The division has at the time of this report a remaining budget of 766 euros. During the year the budget has been spent to sponsor other conferences (see above) and to support young scientists either through the free registration of students that presented in the special student slots of the annual meeting (1435 euros) or the poster prizes (1500 euros).