

Electrochemistry

Division 2 Bioelectrochemistry Report 2021

ISE Division 2 REPORT –2021

- Current members: 580 (665 in 2020, 602 in 2019)
- Chair: Elisabeth Lojou
 - Vice-Chair: Carlo Santoro



- Chair Elect: Ilaria Palchetti
 - Vice-Chair: Yi-Tao Long



• Acting Past Chair: Elena Ferapontova





International Society of Electrochemistry

Summary of the Division 2 activities

Guest editors of SI in Electrochimica Acta dedicated to Belgrade AM

Symposium 5, Elisabeth Lojou

« Coupling electrochemical and optical methods to study chemo- and bioobjects: light as sensor and actuator »

Symposium 6, Tanja Vidakovic-Koch

«Advances in microbial electrochemistry for energy conversion, biotransformation, bioremediation and electroanalysis»



In 2020

Shelley Minteer

University of Utah, USA has been selected as the winner of

the Bioelectrochemistry Prize of the ISE

Congratulations!

The prize was awarded in recognition of her outstanding contribution to the field of bioelectrocatalysis and biofuel cells, in particular, for developing novel enzyme immobilization and stabilization strategies and applications of enzymatic cascade systems and novel enzymes for efficient and stable bioelectrocatalysis.

The Award lecture at the 2021 Annual Meeting in Jeju, Korea

The Bioelectrochemistry award is awarded every two years

04/10/21

to a scientist who has made an important contribution to the field of bioelectrochemistry.



In 2020

Carlo Santoro

University of Milano-Bicocca has been selected as the winner of

the Tajima Prize of the ISE

Congratulations!

The Tajima Prize recognises the contributions made by younger electrochemists. Awards are made every year.

The Award lecture at the 2021 Annual Meeting in Jeju, Korea



In 2021

Julea Butt

School of Chemistry, University of East Anglia, Norwich, **UK** has been selected as the winner of

the Katsumi Niki Prize for Bioelectrochemistry

Congratulations!

The prize was awarded in recognition of his outstanding contribution to the fields of enzyme bioelectrochemistry, biosensor, bioelectronics, biofuel cell, and biocomputing.

The Award lecture will be given at the 2022 Annual Meeting in Xiamen, China

The Katsumi Niki award is awarded **every two years** to a scientist who has made an important contribution to the field of bioelectrochemistry.

In 2022

We are waiting for your proposals/nominations for

The Bioelectrochemistry Prize

https://www.ise-online.org/awards/bio_div2.php

Previous prize winners:

Frieder Scheller (2008), Arkady Karyakin (2012), James Rusling (2014), Jacek Lipkowski (2016), David Waldeck (2018) Shelley Minteer (2020)

Sponsored Meetings in 2021

19-21 April: Biophotoelectrochemical Systems: Solar Energy Conversion and Fundamental Investigations

Location: Cambridge, UK; Contact: Jenny Zhang (transferred from 2020) https://www.ch.cam.ac.uk/group/zhang/biophotoelectrochemical-workshop-2020

13-17 June: THE 18th EUROPEAN CONFERENCE ON ELECTROANALYSIS

Vilnius, Lithuania; Contact: Rasa Pauliukaitė (transferred from 2020) http://www.eseac2020.com/

Sponsored Meetings in 2021

9 -12 March: European Biosensor Symposium

Online, Germany; Contact: Fred Lisdat

https://www.th-wildau.de/forschung-transfer/institute-of-life-sciences-and-biomedical-

technologies/biosystemtechnik/european-biosensor-symposium-2021/

9-13 May: XXVI Int. Symposium on Bioelectrochemistry & Bioenergetics Cluj-Napoca, Romania; Contact: Robert Săndulescu https://www.bes2021.org/org_comm.html

5-9 November: 10th Workshop on Surface Modification for Chemical and Biochemical Sensing Zelechow, Poland; Contact: Wlodzimierz Kutner
<u>http://www.smcbs.pl</u>

8-12 November: Modern Electrochemical Methods XL

Jetřichovice, Czech Republic; Contact: Lenka Srsenová - http://www.bestservis.eu/

International Society of Electrochemistry

72st Annual Meeting of ISE 29 August - 3 September, Jeju Island, Korea

2021

"Electrochemistry from Fundamentals to Products" More information to be announced in the ISE web-site





THE KOREAN ELECTROCHEMICAL SOCIETY 한국전기화학회

Aug. 29 - Sept. 03, 2021 in association with KECS

72nd ISE Annual Meeting

JEJU

JEJU Airport

Jungmun ourism Complex

Ο Seogwipo

Hong Kong

From Fundamentals to Products

Sogang Univ, Co-Chair

OC Members





GIST

Hye Jin Lee, Taek Dong Chung Kyungpook National Seoul National Univ.



UNIST, Co-Chair



Marc Koper, Gunther Wittstock, Alison Downward, Deborah Jones, Leiden, Netherland Oldenburg, Germany

Christchurch, Montpellier, France New Zealand

LOC Members



(KIST), Chair of LOC (DGIST), Adviso

2021 - 72th Annual Meeting of ISE, Jeju

Symposium 4

Bioelectrochemistry: from fundamentals to applications

Sponsored by: Division 2, Bioelectrochemistry

The aim is to highlight new concepts and trends in bioelectrochemistry to understand electron transfer processes in biology, both fundamental and applications. <u>Topics include but are not limited to</u>:

 Theoretical or experimental approaches that lead to improved understanding of the electrochemical and catalytic behavior of biological systems.

- Surface analytical methods coupled to electrochemistry for imaging biointerfaces and for providing structural and spatio-temporal information of bio-objects.
- Bioelectrocatalysis using nanoparticles, supramolecular assemblies, or mesoporous networks.
- Biosensors and bioanalytical methods based on biological electron transfer and biocatalysis.
- Biofuel cells for energy production and bioelectrosynthesis for fuel production
- Photobioelectrochemistry in multielectron transfer biological systems.
- Efficient extracellular electron transfer systems and their electrochemical study

Symposium Organizers:

Elisabeth Lojou (Coordinator), CNRS, France (lojou@imm.cnrs.fr) Shelley Minteer, University of Utah, USA Taek Dong Chung, Chungnam National University, Korea Seong, Jung Kwon, Konkuk University, Korea

2021 - 72th Annual Meeting of ISE, Jeju

Symposium 5

New Electrochemical Approaches and Devices for Monitoring Diseases and Human Health

Sponsored by: Division 2, Bioelectrochemistry Division 1, Analytical Electrochemistry

The symposium focuses on recent developments in electrochemical sensing systems and approaches for biomedical research and clinical diagnostics, also including electro-biological models for drug discovery, toxicity evaluation and antibiotic resistance screening. The symposium aims to overview both the state-of-the-art research and technological progress in the area. <u>Topics include but are not limited to:</u>

Electrochemical assays and diagnostic devices for disease prognosis and monitoring and therapy evaluation;
 Drug delivery and wearable healthcare devices (including those for disease monitoring) based on electrochemical working principles;

3.New strategies for production, modification&application of micro- and nanoelectrodes for *in-vitro&in-vivo* biosensing; 4.Development of *in vitro* and animal models for electrochemical screening of drugs and cellular transformations during diseases.

Symposium Organizers:

Elena Ferapontova (Coordinator), Aarhus University, Denmark (elena.ferapontova@inano.au.dk) Ilaria Palchetti, University of Florence, Italy Haesik Yang, Pusan National University, Korea Zong-Hong Lin, National Tsing Hua University, Taiwan

2021 - 72th Annual Meeting of ISE, Jeju

Symposium 18

Bringing Biomolecules and Electrodes together: Understanding Electron Transport in Life

Sponsored by: Division 2, Bioelectrochemistry Division 6, Molecular Electrochemistry

This symposium will gather scientists working within the rapidly expanding community of BioMolecular Electronics and related fields, who are using electrified interfaces to understand the key ingredients supporting electron transfer/transport in life. The symposium will cover all aspects of electron transport/transfer in molecular or biomolecular moieties where the electrochemical characterization has or could find an essential role. ... The symposium will target studies that range from fundamental approaches, including single-molecule or nanoscale electrical platforms and computational modelling, to micro-scale molecular junctions involving hybrid micro/nano-structured materials for device applications. ...attracting researchers interested on ... molecular electron transport, ..., from physical mechanisms and structural aspects of it, to ... potential electrical applications such as molecular transistors, (bio)molecular sensors, sequencing platforms, etc..

Symposium Organizers: Ismael Díez-Pérez (Coordinator) King's College London, UK (ismael.diez_perez@kcl.ac.uk) Pau Gorostiza, Institute for Bioengineering of Catalonia, Spain Renata Bilewicz, University of Warsaw, Poland Magdaléna Hromadová, J. Heyrovsky Institute of Physical Chemistry, Czech Republic Byung-kwon Kim, Sookmyung Women's University, Korea Yangrae Kim, Kwangwoon University, Korea

Oral and Poster prizes at Jeju annual meeting

This year is again an "exceptional" year, and our symposia received many student oral abstracts, so that our Div decided to award 2 students for their oral presentation in our main symposium. We are pleased to announce the names of the winners:

-1- Leonardo Castañeda-Losada, Electrobiotechnology, Technical University Munich

<u>CO₂-fixating Bioelectrocatalytic Cascades in Redox-Active Hydrogel for Stereoselective C-C Bond Formation via Reductive</u> <u>Carboxylation</u>

-2- Luiza Wasiewska, Tyndall National Institute, Cork, Ireland

Development of Ultra-Sensitive, On-Chip Biosensor for Detection of stx1 Gene Using Interdigitated Microelectrodes Modified with Chitosan-Gold Composite.

We also awarded 3 poster prizes:

In symposium 4: Sofiia Tvorynska, Charles University, Prague 2, Czech Republic

Investigation of Flow Amperometric Biosensor Based on Two Enzymatic Mini-Reactors for Determination of Acetylcholine

In symposium 5: Yunpei Si, Green-Nano Materials Research Center, Daegu-city, Republic of Korea

Electrochemical Detection of Dopamine Using Carbon Nanocomposites Modified Carbon Electrode

In symposium 18: Tracy Ha, London

Charge Transport and Electrochemistry of Immobilized Ferritin on Self-Assembled Monolayers

International Society of Electrochemistry 2022

73rd Annual Meeting of ISE 23-28 October, Xiamen, China

"Electrochemistry-Powering a healthier planet" More information to be announced in the ISE web-site soon

Scientific Topics

- Analytical electrochemistry for clinical diagnostics & public health
- Micro/Nano-scale systems for analytical electrochemistry
- Single entity electrochemistry
- Brain electrochemistry: from single vesicle to in vivo
- Bioelectrochemical energy transformation for a sustainable planet
- Hydrogen energy & fuel cells
- Lithium ion batteries & Lithium-metal based batteries
- Supercapacitors
- Solar cells and solar fuels
- Advanced batteries without borders
- Rational design, synthesis and mechanisms of (photo)electrocatalysts: from nanocrystals to supported single atoms
- Battery materials: preparation, characterization and interfacial engineering
- Electrochemical conversion and utilization of carbon, nitrogen and biomass resources
- Flexible electrochemical materials for the future wearable devices



Scientific Topics

- Electroplating and corrosion: from traditional industries to advanced manufacture
- Molten-salt electrochemistry for sustainable metallurgy and energy conversion
- Electrolysis for modern science and engineering
- Molecular electrochemistry & electronics: from principles to devices
- Lightening up with electrochemistry for smart analysis & display
- Nonaqueous electrochemistry and green electrosynthesis
- (Photo)Electrochemistry of semiconductor: structure, mechanism and performance
- High-sensitivity and high-resolution spectroeletrochemistry: surface/interfacial structure and reaction mechanism
- Scanning electrochemical probe microscopy and coupling techniques
- Theoretical electrochemistry: modelling and simulation
- Education for electrochemical science and engineering
- General



Symposium 3 From molecular to microbial electrochemical sensing and biosensing

Sponsored by: Division 2, Bioelectrochemistry

Division 1, Analytical electrochemistry

The symposium focuses on recent developments in electrochemical sensing and biosensing, including cutting-edge applications in healthcare, environmental monitoring, food quality control, forensic tests, and security standards. One of the main objectives of the symposium is bringing together bio-electrochemists and analytical electrochemists. The symposium aims to promote discussion on:

- innovative and sustainable functional materials for the development of electroanalytical biosensing platforms
- sensing approaches based on imprinted polymers, nanozymes and aptamers
- self-powered (bio)sensors
- Lab-on-a-chip and point-of-care testing (POCT) biosensing devices
- electrochemical strategies for drug discovery and drug delivery sensitive (photo)electrochemical detection strategies
- biosensors for microorganism detection (including MIP- and aptamer- based sensors)
- in vivo electroanalysis

Symposium Organizers:

Ilaria Palchetti ilaria.palchetti@unifi.it

- Wlodzimierz Kutner
- Mathieu Etienne

Baohong Liu

Symposium 4 Bioelectrochemistry – from fundamentals to applications Division 2, Bioelectrochemistry

The main symposium of division 2 of ISE will cover a broad range of bioelectrochemical topics. I will comprise fundamental studies devoted to a deeper understanding of biomolecular systems on electrodes and will hereby include proteins, nucleic acids but also other biomolecules. It will also cover alternative approaches to native biomolecules such as MIPS or aptamers. It will deal with new technical developments in order to get information of biomolecules on surfaces or combined transduction methods such as spectroelectrochemistry. Furthermore, the combination of light with bioelectrochemistry will be treated (biophotovoltaics). Different directions of application are also part of the symposium such as bioelectronics, biocomputing and biofuel cells. Attention will be given to the combination of biological systems with nanoparticles and -structures as well as integration into microfluidic devices.

Symposium Organizers: **Fred Lisdat** <u>flisdat@th-wildau.de</u> Renata Bilewicz Omer Yehezkeli Feng Zhao

Symposium 5 Brain bioelectrochemistry – from fundamentals to neurochemical analysis Division 2, Bioelectrochemistry

This symposium focuses on electrochemical analysis for addressing hottest questions in brain research and plans to bring scientists with interdisciplinary backgrounds in chemistry and neuroscience all together for sharing thoughts and updates on in vivo electroanalysis of brain chemistry. Aiming at interfacing cutting-edge sensing technologies and frontiers of neurochemistry, this symposium will discuss on the latest progress in electrochemical measurements of neurologically important molecules by electrode/brain interface engineering, (bio)electrocatalyst design and synthesis, ion-transport regulation, biosensing, single vesicle/cell analysis, in vivo analysis and concurrent electrochemistry-electrophysiology, etc.

Symposium Organizers: Lanqun Mao (lqmao@bnu.edu.cn) Andrew G. Ewing B. Jill Venton

Symposium 6 Enzymes and bioinspired molecular objects for (bio)electrocatalysis and (bio)electrosynthesis

Sponsored by: Division 2, Bioelectrochemistry Division 6, Molecular electrochemistry

(Bio)electrocatalysis and (bio)electrosynthesis are attractive processes in a sustainable context. Enzymes are very specific and efficient catalysts. Biodiversity and enzyme engineering offer new opportunities in energy conversion, electrosynthesis, CO₂ valorization, and production of renewable fuels and added-value chemicals. Nevertheless, long term stability can limit their application. Bioinspired inorganic complexes and nanomaterials can take benefit of the knowledge of redox enzymes while performing over longer duration.

This symposium will discuss recent advances in this field with the main objective of bringing together bioelectrochemists and molecular electrochemists. Topics will include :

- New developments in enzyme and molecular electrochemistry
- New discovered enzymes and enzyme engineering : mutations, fusion of proteins
- Artificial enzyme and biohybrid system
- Minienzymes, biomimetic and bioinspired inorganic complexes, Nanozymes
- Nanostructured interfaces to address redox enzymes, bioinspired models and nanomaterials

Symposium Organizers: Nicolas Plumeré nicolas.plumere@rub.de

Anne Jones

Vincent Artero

Fei Wu

International Society of Electrochemistry

2020

27th Topical Meeting on 18 - 21 May, Salt Lake City, Utah, USA

Cancelled

"Electroanalytical Chemistry and Bioelectroanalysis"

Division 2 together with Division 1 **Organisers**: Sh. Minteer, L. Baker, C. Korzeniewski

International Society of Electrochemistry

Topical Meeting 2024

Sibenik, Croatia

" Modern electrochemical aspects of marine and environmental research in the era of new technologies"

Division 2 together with Divsion 1

2023 – 74th Annual Meeting of ISE, Lyon

Now thinking about symposium topics.

Any ideas from the members are welcome!

Division 2 Facebook

http://www.facebook.com/pages/ISEDivision-2-Bioelectrochemistry/ 156450904449193

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