

# International Society of Electrochemistry (ISE)

## Division 6, Molecular Electrochemistry

### 2019 Annual report

#### 1. Division 6: present status

According to the ISE database (August 2019) **ISE Division 6, dealing with Molecular Electrochemistry**, includes **525 active members**.

Its activities are currently coordinated by the following Committee:

- **Chair:** Patrizia R. Mussini (Milano, Italy)
- **Past Chair:** Olivier Buriez (Paris, France)
- **Chair Elect:** Magdalena Hromadova (Prague, Czech Republic).
- **Vice Chairs:** Guobao Xu (Changchun, China) and José H. Zagal (Santiago, Chile)

Moreover,

- Francesco Paolucci (Bologna, Italy), a former Division 6 Chair, is **ISE Vice President** (Executive Committee) 2019-2021
- Jiri Ludvik (Prague, Czech Republic), also a former Division 6 Chair, has been appointed by nomination of ISE Divisional Officers at the ISE Meeting in Durban in the **nomination committee for ISE senior officers** (President, Vice Presidents, Secretary, Executive Secretary)

#### 2. Division 6: scientific activity in 2019

##### 2.1 2019 Scientific meetings

During 2019 our Division has been involved in the organization of high-level scientific meetings in Africa, America, Asia, and Europe.

##### 2.1.1. 70th ISE Annual Meeting in Durban (South Africa)

At the 70th ISE Annual Meeting (Durban, South Africa, August 4-9th, 2019) our Division organized or coorganized **four Symposia**, also supporting **several young author poster prizes**:

- **Symposium 14**  
***Molecular Electrochemistry: from Fundamentals to Applications***  
Sponsored by Division 6, Molecular Electrochemistry  
(organizers: **M. Hromadova**, **G. Xu**, J.Conradie, S. Radhakrishnan)

*including 2 young author poster prizes* awarded to Emmie Chiyindiko and Nandisiwe Mateyise

This Symposium was opened by a keynote lecture by **Siegfried Waldvogel**, the 2018 recipient of our prestigious Heyrovsky Prize.

- **Symposium 5**

*Gold and Related Noble Metals in Electroanalysis, Electrocatalysis, and Electrochemical Devices*

Cosponsored by Division 6, Molecular Electrochemistry together with Division 1, Analytical Electrochemistry

(organizers: **P. Mussini**, **F. Paolucci**, A. Walcarius, M. Muchindu, Jessie Pillay)

*including two young author poster prizes cosponsored with Division 1* awarded to Gcinisizwe Dlamini and Vuyelwa Ngwenya.

- **Symposium 13**

*Electrografting of Materials: from Fundamentals to Applications*

Cosponsored by Division 6, Molecular Electrochemistry, together with Division 4, Electrochemical Materials Science

(organizers: **O. Buriez**, F. Podvorica, P. Hapiot, S. Chigome, P. Mashazi)

- **Symposium 4**

*Renewable Energy and Photo-Electrochemistry*

Cosponsored by Division 6, Molecular Electrochemistry together with Division 3, Electrochemical Energy Conversion and Storage and Division 4, Electrochemical Materials Science

(organizers: F. Rosei, B. Liu, C. Janaky, F. Marken, M. Maaza, M. Diale).

*including a young author poster prize cosponsored with Division 4*, awarded to Thomas Maier.

Moreover, on the occasion of the Durban Annual Meeting

- in the plenary prize ceremony, **Siegfried Waldvogel** received the prestigious 2018 Heyrovsky Prize awarded by our Division *“for his innovative and outstanding contributions to the field of organic electrosynthesis and particularly for the development of valuable methods/approaches allowing the preparation of high added value”*
- we held **our annual Divisional meeting** (between the morning and afternoon sessions on Thursday August 8th).

### 2.1.2. ISE Topical Meeting 2019 in Merida (Mexico)

In America our Division cosponsored together with Division 4 the

**24th ISE Topical Meeting 2019**  
*“Electrochemical Assembling  
at the Meso, Nano and Molecular Scale”*

which took place from 7 to 10 April 2019 in Merida, Mexico.

The Organizing Committee included

- **Carlos Frontana**, CIDETEQ, Mexico (*co-chair*), **past Division 6 vice-Chair**
- Ignacio González, UAM, Mexico (*co-chair*)
- **Olivier Buriez**, École Normale Supérieure de Paris, France, **past Division 6 Chair**
- Stanko R. Brankovic, University of Houston, USA
- Tom Breugelmans, University of Antwerp, Belgium
- Linda González-Gutiérrez, CIDETEQ, Mexico (*co-chair*)

This Topical Meeting was aimed at discussing and analyzing molecular and/or fundamental concepts regarding phase formation or electrode functionalization (like mechanisms of molecular electron transfer in phase formation, surface engineering of electrode materials for electrochemical processes; electrochemical assemblies at the nano and microscales for immobilization of biomolecules, electrochemical methods for functional coatings), with possible application at the nano (for example biosensors), molecular (*e.g.* electrocatalysis, inhibitors in corrosion research) and meso scale (functional coatings, either decorative or functional, electrofinishing of surfaces).

### 2.1.3. 17th ISEAC & 3rd ECL Meeting in Changchun (China)

In Asia **our Division vice-Chair Guobao Xu** chaired the organizing committee of the ISE-sponsored meeting (which also included **our former Division chairs C. Amatore, Francesco Paolucci, M. O. F. Goulart and O. Buriez** in the International Advisory Board. **Prof. C. Amatore and Francesco Paolucci have presented plenary lectures**)

*The 17th International Symposium on Electroanalytical Chemistry  
& the 3rd International Meeting on Electrogenenerated Chemiluminescence*

which took place in Changchun, China  
from 22 to 25 August 2019.

The event conveniently combined this year's editions of

- **ISEAC**, a classical series of meetings started in 1987, aimed to provide an open forum to all electroanalytical chemists in the world to discuss their recent findings and information, exchange their mutual interests and broaden area of electroanalytical chemistry for possible cooperation and international friendship to gather the large and exciting variety of current research activities in the field;
- and **ECL**, a meeting series recently started in 2017, addressing fundamental issues, recent developments, bioanalytical and real applications of electrochemical luminescence, including all modern aspects (NPs, QDs, molecular probes, theory, simulation, new systems and strategies, nanomaterials, novel applications, devices, hyphenated techniques, etc.).

#### ***2.1.4. 11th Central European Meeting on Molecular Electrochemistry (CEMME) in Chemnitz (Germany)***

In Europe our Division sponsored, contributing to accommodation of young scientists, the

#### **11th Central European Meeting on Molecular Electrochemistry (CEMME 2019)**

to be held in Chemnitz (Germany) from 17 to 19 November 2019

This scientific event, which includes our **Division former chair Jiri Ludvik (Czech Republic) among its organizers**, is a specialized international meeting specifically devoted to Molecular Electrochemistry of organic, inorganic and organometallic molecules, metal-organic and bioinorganic complexes and supramolecular systems particularly aimed to PhD students, post-docs and young scientists (and their supervisors or more experienced colleagues), and particularly focusing on mechanistic studies and investigations of relationship between structure and redox reactivity on molecular level, a key scope of our Division.

#### **2.2 Our 2019 Jaroslav Heyrovsky Prize for molecular electrochemistry**

Awarded in previous years to Flavio Maran (2014), R. Daniel Little (2015), Ismael Diez Perez (2016), Armando Gennaro (2017), and Siegfried Waldvogel (2018), who received the Prize and delivered his JHP lecture at the 2019 AM in Durban, South Africa), **the 2019 edition of our prestigious Jaroslav Heyrovsky prize for Molecular Electrochemistry has been awarded to**

**Christian Amatore. He will receive the prize and deliver his JHP lecture at the 2020 AM in Belgrade, Serbia.**

All members of Division 6 are invited to advance nominations for 2020 by the deadline of 1 May, 2020

(instructions at: <http://www.ise-online.org/awards/heyrovsky.php>).

Importantly, re-nomination is possible (except for winners of preceding editions of the prize); the procedure for re-nomination is straightforward!

### 3 Planned future activities

#### 2.2.1 Future ISE Annual meetings

##### a) 2020: 71st ISE Annual Meeting Belgrade, Serbia

At the 71st ISE meeting in Belgrade (Serbia) in 2020 our Division will be involved in the organization of the following Symposia:

- **Symposium 14**

##### ***Future of molecular electrochemistry***

Sponsored by Division 6, Molecular Electrochemistry

(Organizers: **P. Mussini, M. Goulart** [former Division 6 chair], **J. Ludvik** [former Division 6 chair])

***Focus/Call for contributions:*** In recent years, there has been a tremendous resurgence in the field of electrochemical transformations at the molecular level, promoted inter alia, by the development and exploitation of new electrode materials, media, cell configurations and/or of new electrosynthetic strategies, affording new products or improved performances in terms e.g. of improved yield and/or selectivity, lower costs, simpler synthetic pathways and/or better ecocompatibility; by the increasing need of understanding and rationalizing the electron transfer mechanisms involving complex electroactive organic, organometallic or coordination molecules or related materials to master and optimize their application in e.g. molecular electroanalysis, molecular electrocatalysis, molecular material science, molecular optoelectronics/ non-linear optics/ chiroptics/ spintronics, molecular (bio) energetics, molecular media (ionic liquid/liquid crystals/ DES...), as well as biology, pharmaceuticals, and medicine. The Symposium devoted to the present and future of molecular electrochemistry will therefore cover a broad range of topics including, but not limited to: fundamental investigations on the mechanisms of action or transformation of the above molecules or molecule materials, on their reactivity initiated by electron transfer and on the relationship between structure and redox properties; new tools, protocols and/or strategies for bond activation by ET for (electro)synthetic purposes; investigation, also by application of combined techniques and combining experimental data with theoretical computations, of the electronic features of complex molecules and molecular systems, dealing e.g. with issues like intramolecular electronic communication, multiple interacting redox centres, host-guest interactions, electrochromism, redox properties affected by conformation change, stereoelectrochemistry, enantioselectivity at electrochemical interphases, to electrochemistry, etc.

- **Symposium 1**

***Membrane-based electrodes: from traditional potentiometry to dynamic electrochemistry***

Cosponsored by Division 6, Molecular Electrochemistry together with Division 1, Analytical Electrochemistry and Division 3, Electrochemical Energy Conversion and Storage

(Organizers: M. Cuartero Botia, G. Crespo, M. A. Navarra, **G. Xu**, V. Mirceski)

***Focus/Call for contributions:*** Membranes are used in many different applications in which electrochemistry techniques act as the analytical signal readout or to fully tune ion transfer processes across the membrane. This symposium aims to bring together current studies involving membrane-based electrodes and also the use of ion exchange membranes for miscellaneous purposes. Thus, the scope of this symposium include (among others): Ion selective electrodes: fundamentals and analytical applications; Novel concepts involving ion exchange membranes; Tuned ion transfer processes (in terms of selective receptors and the readout); Theoretical modelling of the working mechanism of membrane-based electrodes; The exploration of new materials in membrane-based electrodes; Water remediation processes; Proton exchange membranes fuel cells and electrolyzers; Healthcare and other applications; Nanopore electrochemistry; Biomembrane electrochemistry; Electroanalysis based on microdialysis

- **Symposium 15**

***When molecular electrochemistry meets luminescence: from fundamentals to analytical applications***

Cosponsored by Division 6, Molecular Electrochemistry together with Division 1, Analytical Electrochemistry

(Organizers: **O. Buriez**, **G. Xu**, C. Hogan, N. Sojic, R. Vasilic)

***Focus/Call for contributions:*** In recent years, the combination of molecular electrochemistry and luminescence has begun to show significant potential for the development of new superior analytical strategies. Accordingly, this symposium will address fundamental aspects, recent developments and (bio)analytical applications of redox molecules (organic, organometallic, coordination compounds) possessing luminescent properties. This symposium will cover a broad range of topics including, but not limited to: electrochromism, electrogenerated chemiluminescence (ECL), new molecular luminophores, mechanistic investigations, the development of new enabling instrumentation for coupling of electrochemistry and luminescence, simulation and theoretical aspects of related phenomena, sensors and biosensors based on electrochemistry and luminescence. The purpose of this symposium is thus to bring together the leading scientists working in all these aspects, in order to stimulate intensive discussion and initiate/improve collaborations.

b) 2021: 72nd ISE Annual Meeting, Jeju, South Korea

As discussed in our Divisional Meeting in Durban, in the 72nd ISE meeting in Jeju (South Korea) which will take place in 2021 our Division will be involved in the organization of several Symposia (the detailed program is currently being assessed)

- A Symposium will be focused on **Organic Electrosynthesis** (the optimized title is currently under assessment) This Symposium will be sponsored by Division 6, Molecular Electrochemistry, with the possible addition of Division 7, Physical Electrochemistry, and will include among its organizers Division 6 members **Siegfried Waldvogel** (2018 Heyrovsky prize recipient), **Jiri Ludvik** and **Marilia Goulart** (both former Division chairs).
- Symposium **Molecular Electroanalysis** (assessed title) will be cosponsored by Division 6, Molecular Electrochemistry together with Division 1, Analytical Electrochemistry and will include among its organizers **Patrizia Mussini** (Chair Division 6), a further member of Division 6 Committee (probably **Guobao Xu**), and **Luigi Falciola** (Chair Elect Division 1)

***Focus/Call for contributions:** Molecular electrochemistry and Electroanalysis are reciprocally indissolubly linked and reciprocally provide fundamental support. In fact (i) on one hand the elucidation of electron transfer process mechanisms is the necessary condition for the conscious, straight optimization of new electroanalytical methods and protocols (rather than random or trial-and-error approaches, unfortunately very common), (ii) on the other hand, electroanalytical techniques, also combined with other analytical and/or computational ones, are providing more and more powerful tools for the elucidation of complex electron transfer mechanisms or of electron transfer processes in complex molecules or materials. In this context the type and extent of information obtainable for electroactive molecules can be remarkably widened. The symposium will thus particularly focus on: electroanalytical tools, techniques and/or protocols for the elucidation of electron transfer processes, particularly in complex molecules and materials: new approaches or application of existing ones to solve complex cases; Electroanalytical tools, techniques and/or protocols, and/or integration with other analytical or computational techniques enabling to extend the range of information obtainable for electroactive molecules and materials; Optimization of electroanalytical methods or protocols on the basis of electron transfer mechanism elucidation.*

- Ideas for one or more further (co)sponsored Symposia, like *Luminescence in electrochemistry: Molecular electrochemistry, analytical applications and devices; Electrogenerated Chemiluminescence: Analytical applications and light emitting devices; Single molecule electrochemistry; Nanocluster*

*electrochemistry; Supramolecular electrochemistry and Molecular Machines* are also being discussed.

- Division 6 should also join the other Divisions in sponsoring an interdivisional Symposium focusing on **Electrochemistry knowledge transfer: from academy to startup company and industries**

#### c) 2022, 2023 and 2024 ISE Annual Meetings

The subsequent ISE meetings will take place as follows:

- 2022: **73rd ISE Annual Meeting, Xiamen (China)**; our involvement in the scientific organization of this congress will start next year.
- 2023: **74th ISE Annual Meeting, Lyon (France)**
- 2024: **75th ISE Annual Meeting, Montreal (Canada)**

#### **2.2.2 Future ISE Topical meetings**

Our Division will be the sponsor of one of the four next future ISE topical meetings, to be held in Chile in Spring 2021:

##### **2020**

*Topical Meeting 1* 29 March - 1 April, Tainan, Taiwan (26th ISE Topical Meeting)  
*Metal Deposition for Semiconductor and Green Energy*

*Topical Meeting 2* 18 - 21 May, Salt Lake City, Utah, USA (27th ISE Topical Meeting)  
*Electroanalytical Chemistry and Bioelectroanalysis*

##### **2021**

**Topical Meeting 1** 29 March - 1 April, Santiago, Chile (28th ISE Topical Meeting) **Challenges in Molecular Electrochemistry and Surface Reactivity. Sponsored by our Division 6, and with its committee including our vice chair Josè Zagal**

*Topical Meeting 2* 18 - 21 April, Mikulov, Czech Republic (29th ISE Topical Meeting) *Energy and water: electrochemistry in securing the sustainable society development*



#### 4. 2019 Division 6 Budget

(provisional in mid October 2019)

2019 Resources		2019 Expenditures	
Remaining 2018	Eur 1806.36	Merida Topical Meeting Young Author Poster Prize	Eur 200.00
Allocated 2019	Eur 2637.46	Heyrovsky Prize	Eur 750.00
		ISE Meeting young authors prizes	Eur 690.00
Meeting surplus participation	Eur 358.93	CEMME Meeting contribution for young scientist participation	Eur 600.00
Meeting surplus participation	Eur 358.93		
	<b>Currently available to Division 6 (2019 mid October)</b>	<b>Eur 2921.68</b>	

#### 5. Call for help from Division members!

##### *a) Providing ISE with educational/teaching materials and media in molecular electrochemistry*

ISE is currently working to develop new communication strategies and tools to enhance fast, direct communication among members, particularly young ones, among Divisions, among members and officers, among officers,...

A special focus will be on promoting and supporting electrochemistry teaching, particularly for undergraduate and PhD students, but also for scientists of different expertise.

**In this context a contribution of materials and media in molecular electrochemistry from our Division Members would be a precious asset.**

##### *b) Contributing to our Division activities*

Division 6 Committee looks forward to receive from Division members

- Proposals of **topical meetings** or of **specialized meetings** that can be supported by our Division
  - Nominations of candidates for our Divisional Prize and for ISE prizes and honours** like Frumkin Medal, Electrochimica Acta Gold Medal, ISE fellowship...
  - Proposals of activities/tools/media/policies to support **young molecular electrochemistry scientists**
  - Proposals of activities/tools/media/policies to support **molecular electrochemistry scientists** in general
  - Information about **new molecular electrochemistry books, grant opportunities, collaboration opportunities** etc.
- and any other useful suggestion.