

International Society of Electrochemistry (ISE)

Division 6, Molecular Electrochemistry

2020 Annual report

1. Division 6: present status

According to the ISE database (August 2020) **ISE Division 6, dealing with Molecular Electrochemistry**, includes **518 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 Responsible for Communication and External Relationships** (Executive Committee) 2019-2021

ISE Divisional Elections for Chair Elect 2021/2022 (Chair 2023/2024) have taken place in October 2020.

2. Division 6: scientific activity in 2020

2.1 2020 Scientific meetings

Due to the dramatic outbreak of the 2020 Covid pandemic, many scientific meetings have been cancelled or postponed (hopefully to 2021). An example is the Frumkin Symposium, to which our Division had already granted its sponsorship, which should have been held in Moscow in November 2020. Instead the 71st ISE Annual Meeting has not been cancelled, but converted in online mode.

2.1.1. 71st ISE Annual Meeting in online mode

In 2020 the ISE Annual Meeting, originally scheduled to be held in Belgrade, Serbia, from August 31st to September 5th, has been held for the first time in online mode. In particular,

- prize and plenary sessions, the general assembly and a general poster session have been organized by the ISE Committee,

- most of the originally planned Symposia have taken place, organized by the Symposia Committees that volunteered to convert them in online mode.

In this frame, our Division has been 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, J. Ludvik, with junior ISE member coorganizers S. Arnaboldi, M. Magni, S. Grecchi)

This Symposium was managed in asynchronous online mode on Teams platform + live events also on Teams platform, including the Divisional Meeting. The **Symposium 14 Hall** (accessible following instructions on a dedicated Symposium portal site) offered to registered attendants **keynote lectures** (Naaman, Hildebrandt, Little), **invited lectures** (Costentin, Isse, Blanchard, Magdesieva, Feroci), **oral presentations, flash presentations linked to posters, posters and/or poster abstracts**. Each presentation corresponded to a subchannel including a post thread for interactions with the presenting author. Presentations were **grouped by subjects** and complemented by **live discussion sessions** chaired by authoritative scientists. A **young author poster prize** was awarded (to **Jie Luo**) by the Symposium prize committee (Ludvik, Xu, Zagal, Magni, Arnaboldi). About 140 presenters or attendants have been registered in the Symposium Hall.

During the Symposium we also held our **Annual Division 6 Meeting**, beginning with **commemorations of Prof. Jean Michel Savéant** (by Prof. C. Costentin) and of **Prof. Dennis Peters** (by Prof. D. Little).

Symposium 1

Membrane-based electrodes: from traditional potentiometry to dynamic electrochemistry

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

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

This Symposium was also converted in online mode with synchronous presentations on Thursday and Friday mornings.

Symposium 15

When molecular electrochemistry meets luminescence: from fundamentals to analytical applications

Cosponsored by Division 1, Analytical Electrochemistry and Division 6, Molecular Electrochemistry

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

Posters from this Symposium were presented in the general session, while oral presentations were delivered within online Symposium14.

2.2 The 2020 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), Siegfried Waldvogel (2018), and Christian Amatore (2019) **the 2020 edition of our prestigious Jaroslav Heyrovsky prize for Molecular Electrochemistry has been awarded to Justin Gooding.**

All members of Division 6 are invited to advance nominations for 2021 by the deadline of 1 May, 2021

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

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

2.3 Electrochimica Acta Gold Medal 2020 to Christian Amatore

One of the most prestigious ISE prizes (together with the Frumkin medal), awarded in previous years to D. Kolb (1990), S. Trasatti (1992), M. Armand (1994), L. Peter (1996), T. Osaka (1998), A.J. Arvia (2000), B.E. Conway (2002), J. Lipkowski (2004), A. Wieckowski (2006), P. N. Bartlett (2008), U. Stimming (2010), M. Watanabe (2012), A. Bond (2014), H. Abruna (2016), J. M. Feliu Martínez (2018) , **the 2020 Electrochimica Acta Gold Medal has been awarded to Christian Amatore**, implying a significant acknowledgement to molecular electrochemistry, being at the very core of Amatore's polyhedral science.

3 Planned future activities

3.1 Future ISE Annual meetings

3.1.1. 2021, 72nd ISE Annual Meeting, Jeju, South Korea

For the 72nd ISE meeting scheduled to take place in 2021 in Jeju (South Korea) our Division is involved in the organization of the following Symposia:

Symposium 17

Molecular Electroanalysis

(Sponsored by Divisions 6 and 1)

Tentative keywords:

Electroanalysis and molecular electron transfer processes	Innovative molecular media (ionic liquids, DES...)
Complex electroactive molecules and molecular materials	Molecular electroanalysis at ITIES
Multiple redox centres	Chiral electroanalysis

Preliminary Symposium Description:

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 etc.

Symposium Organizers representing the Divisions:

Patrizia R. Mussini, Università degli Studi di Milano, Dipartimento di Chimica (Italy)
patrizia.mussini@unimi.it (*Division 6 Chair, will be Past Chair in 2021*)

Luigi Falciola, Università degli Studi di Milano, Dipartimento di Chimica (Italy)
luigi.falciola@unimi.it (*Division 1 Chair elect, will be Chair in 2021*)

Guobao Xu, State Key Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, China guobaoxu@ciac.ac.cn

Olivier Buriez, École Normale Supérieure, Département de chimie, Paris (France)
olivier.buriez@ens.fr

Local co-organizers

Symposium 18

Bringing Biomolecules and Electrodes Together: Understanding Electron Transport in Life

(Sponsored by Divisions 6 and 2)

Tentative keywords:

SAM-based molecular junctions	Molecular transistor devices
SPM-based approaches	Mechanical break-junctions
Nano/Micro-structured electrodes	Novel computational approaches to molecular electrochemistry
Nano/Micro-scale Bioelectronics	Single Molecule Electrochemistry

Preliminary Symposium Description (100-300 words):

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. In order to put together researchers with very distinct perspectives of this topic, 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. Such wide vision will ensure attracting researchers interested on very different aspects of molecular electron transport, namely, from physical mechanisms and structural aspects of it, to those interested on potential electrical applications such as molecular transistors, (bio)molecular sensors, sequencing platforms, *etc.*

Symposium Organizers representing the Divisions:

Ismael Díez-Pérez, King's College London (UK), ismael.diez_perez@kcl.ac.uk
Pau Gorostiza, Institute for Bioengineering of Catalonia (Spain), pau@icrea.cat
Renata Bilewicz, Aarhus University, University of Warsaw (Poland),
bilewicz@chem.uw.edu.pl
Magdaléna Hromadová, J. Heyrovsky Institute of Physical Chemistry (Czech Republic), magdalena.hromadova@jh-inst.cas.cz
Local co-organizers

Symposium 19

Physicochemical and Mechanistic Aspects of Organic Electrosynthesis

(Sponsored by Divisions 6 and 7)

Tentative Keywords (4 to 8):

Organic electrosynthesis; Reaction mechanisms; Electrochemical characterization of parent molecules, intermediates and products; Electrode material; Mediator; "Green processes"; theoretical calculation

Preliminary Symposium Description (100-300 words):

Recently, organic electrosynthesis has been attracting much attention of chemists in various fields, due to its dual nature of sophisticated/simple approach for synthesis including high selectivity with environmentally benign system. To better design reactions for organic electrosynthesis, deep understanding of physical electrochemical aspects is an important issue. This symposium will cover a broad range of topics including, but not limited to: organic electrosynthesis, organometallic electrochemistry, the role of electrode materials in organic electrosynthesis, mechanistic investigations, theoretical calculations, mediators and other modes of electrocatalysis, unusual media, asymmetric electrosynthesis, and related areas. 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/foster collaborations.

Symposium Organizers representing the Divisions

Division 6: Siegfried Waldvogel, Marilia Goulart and Jiri Ludvik

Division 7: Shinsuke Inagi (Tokyo Institute of Technology) (inagi@cap.mac.titech.ac.jp)

Shen Ye (Tohoku Univ.), Amanda Garcia (TNO - Dutch Institute for Applied Science)

amanda.garcia@tno.nl; garcia.mandinha@gmail.com

Local co-organizers

Moreover, our Division should be also involved in

Symposium 22

Molecular Electrochemical Switches, Pumps and Machines

and

Symposium 23

Electrochemistry Knowledge Transfer: from Academy to Startup Company and Industries

3.1.2 2022, 2023 and 2024 ISE Annual Meetings

The subsequent ISE meetings will take place as follows:

- 2022: *73rd ISE Annual Meeting, Xiamen (China)*

Electrochemistry for a healthier planet

After the 2020 online Divisional Meeting we have started collecting **Symposia proposals**, possibly also including specific topics suggested by the local organizers (in our case they include for example Molecular Electrochemistry for Electronics, Smart analysis, Lightening and Display, as well as Nonaqueous green [electro]chemistry.) First ones are the following:

- Molecular Electrochemistry and Electronics: from Principles to Devices.
(M. Hromadova, I. Díez Pérez, W. Hong)
- How Molecular Electrochemistry may Shine Light on Analytical Applications (O. Buriez, G. Xu, N. Sojic, C. Hogan)
- 2023: *74th ISE Annual Meeting, Lyon (France)*
- 2024: *75th ISE Annual Meeting, Montreal (Canada)*

3.1.3 Future ISE Topical meetings

Regretfully, due to the pandemy, both 2020 Topical Meetings had to be cancelled.

The two Topical Meetings scheduled for 2021 are the following:

2021 Topical Meeting 1

29 March - 1 April, Santiago, Chile (28th ISE Topical Meeting)

Challenges in Molecular Electrochemistry and Surface Reactivity.

This topical meeting is sponsored by our Division 6, and its committee includes our current Division Vice Chair José Zagal.

It will be possibly postponed to November /December 2021.

2021 Topical Meeting 2

18 - 21 April, Mikulov, Czech Republic (29th ISE Topical Meeting)

Energy and water: electrochemistry in securing the sustainable society development

3.2 Peculiarity and Potentialities of our Division 6 Budget from 2020 to 2021

The pandemic had a significant effect on our Division budget, too, since nearly all meetings have been cancelled or postponed.

3.2.1 Division Budget available in 2020 according to ISE standard rules

A) 2020 new allowance:

*Each division receives $S = 1428.57 \text{ CHF} + (3.69 \text{ CHF} * x)$ where x is the number of members in the division.*

In our case, such new allowance amounted in 2020 to **Eur 2671.47**

B) 2019 residuals:

*Remaining funds from 2019 are transferred to 2020 but only to an upper limit of $2 * S$.*

In our case we managed to keep our remaining funds from 2019 (**Eur 2471.68**) approximately equal to the new allowance, so they were entirely left to us.

C) Past Meeting Surplus:

Our Division 6 had a small surplus in coorganizing the 21st ISE Topical Meeting "Photoelectrochemistry of semiconductors at the nanoscale: from fundamental aspects to practical applications" 23-26 April 2017 Szeged, Hungary. Such surplus, following ISE rules, is being allocated in three years (2018/2019/2020).

Thus in 2020 we received the last third, *i.e.* **Eur 358.93**.

Therefore the **total budget available at the beginning of 2020 was**

A+B+C: Eur 5502.08

3.2.2 Special ISE budget rules for 2020/2021

The divisional funds may normally be spent for

- *sponsoring meetings*
- *divisional prizes (including poster prizes),*
- *providing travel grants to young members or paying the registration fees at ISE meetings.*
- *supporting keynote and invited speakers.*

However, in 2020, **consistently with the pandemic, ISE Divisions had quite less expenditures compared to 2019.**

In our case, for example, in 2020 we **could only support our 2020 Heyrovsky award and one of the young author poster prizes at the ISE online meeting.**

Before the lockdown we had granted our support to the Frumkin Symposium, but this meeting has afterwards been postponed to 2021. Of course in 2021 we would support our cosponsored ISE Topical Meeting in

Chile, possibly postponed close to the end of the year (see above). And it is uncertain whether we will receive meeting support requests before December 2020.

In this frame all Divisions received from ISE the following special rules:

For the calendar year 2020, all ISE Divisions can transfer an unlimited fraction of their 2020 budget into the calendar year 2021. Unless decided differently at a later point in time, the normal rules will apply at the end of calendar year 2021.

Justification:

- *Many meetings have already or will be canceled in this year. Many smaller meetings will not be planned as anticipated. Therefore, Divisions may have problems spending their funds for meeting support, poster awards etc. To avoid spending on secondary items and to preserve resources for a time when meetings can be resumed and perhaps many postponed meetings will take place in 2021, the Divisions shall be enabled to spend more funds in a time when this makes more sense.*
- *Furthermore, the Division budgets will be harmed by the missing surpluses of cancelled ISE TMs in 2020.*

Thus in 2021 we should have an unusually large budget to spend, to hopefully foster the restarting of electrochemical scientific events “in presence” !

We also received from the ISE Treasurer the recommendation to give to Meetings that in this period would require our sponsorship a *binding promise on sponsoring*, with the transfer being made once it is sure that the meeting takes place (while normally it is made as soon as the sponsorship is granted). Moreover ISE is promoting Division efforts to *acquire online meeting resources*.

5. Call for help from Division members!

a) 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.

b) 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.