

2014 Activity Report

Division 5: Electrochemical Process Engineering and Technology

Chair:	François Lapicque (CNRS-Nancy, France)
Past Chair:	Takayuki Homma (Waseda University, Japan)
Chair Elect:	Juan Manuel Peralta Hernandez (CIATEC, México)
Vice Chair:	Giovanni Zangari (University of Virginia, USA)
Vice Chair:	Manuel Andres Rodrigo (Universidad Castilla-La-Mancha, Spain)

A. The Division is organizing the following Symposium for the ISE Annual Meeting;

The Division has organized the following Symposia for ISE Annual Meeting;

65th Annual Meeting in Lausanne, Switzerland (31 August - 5 September, 2014)

Symposium 11: Electrochemical Technology: Crossroad for Energy and Environment

Christos Comninellis (Coordinator), EPFL, Lausanne, Switzerland,
François Lapicque, CNRS and University of Lorraine, Nancy, France,
Juan Manuel Peralta-Hernandez, CIATEC, Leon Guanajuato, Mexico
Manuel Andres Rodrigo, Universidad de Castilla-la-Mancha, Ciudad Real, Spain

Main topics of the Symposium are listed below

- Environmental aspects of electrochemical technology
- Electrochemical wastewater treatment combined with biological treatment
- Engineering approach of CO₂ reduction to fuels for power generation
- Hydrogen production (electrolytic, photo-electrochemical, bio-electrochemical)
- Synthesis and design of novel electrode materials for environmental applications
- Engineering of energy conversion and storage systems (fuel cells, solar cells, bio-fuel cells, redox flow batteries)
- Green electrochemical synthesis
- Electrochemical activation of catalytic reactions (NEMCA effect) for environmental applications
- Electrochemical sensors and systems to reduce environmental impact

Three poster prizes will be attributed by the Division.

B. The Division has sponsored or agreed to sponsor following Meetings;

* 10th European Symposium on Electrochemical Engineering, Chia Laguna Resort Hotel Chia, Domus de Maria (CA), Sardinia Italy,

September 28 - October 2nd, 2014

www.10thesee.it/

The European Symposium on Electrochemical Engineering is organized under the auspices of the Working Party on Electrochemical Engineering (WPEE) of the European Federation of Chemical Engineering (EFCE) in continuation of a successful tradition of Symposia organized since 1984 every three years, aiming to bring together specialists working in the field of Electrochemical Engineering and Applied Electrochemistry and to provide a forum for recent developments and applications in these fields.

We strongly believe that this Conference will once again provide an opportunity to advance communication between academics, researchers and industry. During this event scientists from university and industry, so young researchers will have the chance to network, exchanging useful knowledge at one location.

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The European members of the Division and the members of the WP « Electrochemical Engineering » of the EFCE are actively concerned by the event.

- ASST (Aluminium) 2015 conference (17-21 May 2015, Madeira)

<http://www.asst2015.com>).

The event is devoted to all the aspects related to the Al surface technologies. Especial attention is paid to the corrosion issues and protection of the aluminium-based materials. From the experience of previous ASST conferences the major number of contributions is focused on utilization of different electrochemical surface technologies for protection of Al alloys: different versions of anodization, PEO, electrophoretic processes. The understanding of electrochemical mechanisms of Al corrosion and modelling of respective processes is another principal part together with utilization of localised and integral electrochemical techniques for surface characterization.

Contact: Mikhail.Zheludkevich@hgz.de

C- Future activities

C.1. Symposia organized by Division 5 in the 66th Annual ISE meeting in Taipeh (2015)

* Electrochemical Engineering for improvement of process sustainability (D5)

Juan M. Peralta Hernandez (CIATEC, Mexico): Coordinator

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Shi-Chern Yen (NTU, Taiwan)*: Co-coordinator

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M.A. Rodrigo (UCLM, Spain):

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Alex Peng (ITRI, Taiwan):

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Electrochemical engineering and technology have been employed for improvement of processes in various areas. This Symposium is to be focused on sustainable production of valuable compounds, beneficiation of wastes and side-products together with environment protection, through integration of recently developed materials into the process, and improvement of engineering technology and related concepts. The main topics of the symposium are given below, but other topics may be considered:

- Development and integration of new electrode materials and components in electrochemical processes
 - Application of new electrosynthesis routes and techniques to processes of industrial relevancy
 - Improvement in cell design and operation for the reduction of corrosion issues
 - Advances in hydrometallurgical processes for improved recovery of strategic metals
 - Remediation assisted by electrochemical processes
 - Recent progresses in environment protection processes, in particular for removal of trace pharmaceutical and microbial pollutants in waters
 - Coupling green, renewable energy to electrochemical processes
 - Beneficiation of organic waste by bioelectrochemical processes
 - Modelling and scale up of electrochemical processes from bench scale to the plant
 - Position of electrochemical processes in industrial processes for chemicals production
- **Electrochemical engineering from a quantum description to the plant modeling: experiments and design across length scales (D5-D7)**

Symposium Organizers:

Alejandro A Franco (CNRS-Univ. Picardie, France): Coordinator alejandro.franco@u-picardie.fr

Hung-Lung Chou (NTUST, Taiwan): Co-coordinator hlchou@mail.ntust.edu.tw

Francois Lapicque (CNRS-Univ. Lorraine, France) francois.lapicque@univ-lorraine.fr

Jaeyoung Lee (GIST, Korea) jaeyoung@gist.ac.kr

This symposium **organized jointly by Divisions 5 and 7 of the ISE** focuses on the use of multiscale experimental and/or theoretical approaches - from first principles to the device and up to the plant and/or system level - combining physical electrochemistry and electrochemical engineering in view of designing and optimizing electrochemical processes across length scales. Solicited papers should outline multiscale modelling and spectroscopic-based diagnostics, as well as the design of materials, components, devices, plants and processes of practical interest in particular for electrochemical processing and energy technologies. A tentative list of topics to be covered is given below.

Topics include but are not limited to:

- Advanced experimental techniques for the determination or estimation of physicochemical properties involved in transport phenomena (viscosity, diffusivity, conductivity etc.) relying on electrochemical and/or spectroscopic techniques.
- Computational electrochemistry for predictions of the structure-function relationships of materials and components, physicochemical properties and electrode processes
- Comparison and correlation of physicochemical properties obtained at various scales and using different techniques.
- Prediction of the electrochemical phenomena at interfaces (e.g. liquid/solid, solid/solid, etc.)
- Progresses in understanding of interfacial phenomena at suspended materials.
- Interplaying between electrochemical, mechanical and thermal processes

- System level modelling and control of complex electrochemical processes, non-linearities and chaos.

Keywords: quantum physical electrochemistry, electrode interface, dynamics and nature of interfacial phenomena, multiscale approach, applications of computational electrochemistry, transport properties, electrode phenomena.

C.2. Contribution to the event

“Electrochemical Properties and Applications of Advanced Carbon Materials”

Co-organization with Divisions 1 and 5 of the following ISE Topical Meeting 2015,
Angra do Reis, Brazil, March 2015

Manuel A. Rodrigo and Juan Manuel Peralta Hernandez are members of the Organizing Committee.

Contact person for the event: Edson Ticianelli edsont@iqsc.usp.br

C.3. Contribution to the 66th ISE Meeting (The Hague), 2016

* **Electrochemical Engineering for improvement of process sustainability** (provisional)

Juan Manuel Peralta, Manuel Rodrigo ...

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- **EC power sources: Principles of Materials, Design and Operation (to be organised with Section D3 and D7)** (Provisional)

Contact person for D5: Francois Lapicque

