

**ISE Division 4  
ELECTROCHEMICAL MATERIALS SCIENCE  
Report 2010**

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**8<sup>th</sup> Spring Meeting, May 2 to 5, 2010 Columbus, Ohio, USA**

Advances in Corrosion Science for Lifetime Prediction and Sustainability:  
A Celebration of the 100<sup>th</sup> Birthday of Mars Fontana



**Conference co-chair: Gerald S. Frankel**, *Ohio State University*  
**Conference co-chair: Rudolph G. Buchheit**, *Ohio State University*

This was Division 4's first spring meeting. Keynote addresses were given by Digby Macdonald, Roger Staehle, Roger Newman, Ivan Cole, and Martin Stratmann. At other times there were three or four parallel sessions on the following topics: Coatings, High Temperature Corrosion, Iron and Nickel Alloys, Stress Corrosion Cracking, Concrete, Atmospheric Corrosion, Light Metals, Modeling, Copper, and Oil/Gas/Pipeline Corrosion. There were 154 attendees from 28 countries, 32 of whom were students. In total there were 108 oral presentations and 43 poster presentations.

Many thanks to conference chairmen, Jerry Frankel and Rudy Buchheit for organizing and running an excellent meeting!!!

## **61<sup>th</sup> Annual ISE Meeting – September 26- October 1, 2010**

**Nice, France**

### **“Division Meeting”**

Thursday 30 September 12:30 to 13:45,

*Chair Tom Moffat chaired the Division 4 Luncheon giving an update on the Division's activities. This was followed by a discussion and solicitation for ideas and topics for future symposia.*

### **Division 4 is sponsored and co-sponsored six symposia**

#### Symposium 5

Electroactive Polymers, Inorganic Electroactive Solids, Nanocomposite Materials

Symposium organizers: **Mikhail Vorotyntsev**, (Coordinator) Université de Bourgogne, Dijon, France, **Jean-Claude Moutet**, Université Joseph Fourier, Grenoble, France, **Vessela Tsakova**, Institute of Physical Chemistry, Sofia, Bulgaria, **Galina A. Tsirlina**, Moscow State University, Russia

#### Symposium 6

Corrosion Science: Mechanisms and Methods

Symposium organizers: **Philippe Marcus**, (Coordinator) ENSCP, Paris, France, **Nadine Pébère**, ENSIACET, Toulouse, France, **Francesco Di Quarto**, University of Palermo, Italy, **Hiroki Habazaki**, Hokkaido University, Sapporo, Japan

#### Symposium 7

Electrodeposition for material synthesis and nanostructure fabrication

Symposium organizers: **Catherine Debiemme-Chouvy**, (Coordinator) CNRS, UPMC University, Paris, France, **Olaf Magnussen**, University of Kiel, Germany, **Stanko Brankovic**, University of Houston, Houston, USA, **Michel Rosso**, Ecole Polytechnique, Palaiseau, France, **Daniel Lincot**, ENSCP, Paris, France

Symposium 11  
Sensors and biosensors

Sponsoring Divisions: Division 1, 2 and 4

Symposium organizers: **Fred Lisdat**, (Coordinator) Wildau University, Germany, **Wolfgang Schuhmann**, Ruhr-Universitaet Bochum, Germany, **Alexander Vaskevich**, Weizmann Institute of Science, Israel, **Alain Walcarius**, University of Nancy, France, **Féthi Bédioui**, ENSCP, Paris, France

Symposium 12  
Electrochemistry on a local scale

Sponsoring Divisions: Divisions 1, 4, 6 and 7

Symposium organizers: **Vincent Vivier**, (Coordinator) CNRS, UPMC University, Paris, France, **Emmanuel Maisonhaute**, ENS, Paris, France, **Daniel Mandler**, The Hebrew University, Jerusalem, Israel, **Kei Murakoshi**, Hokkaido University, Sapporo, Japan, **Gunther Wittstock**, Carl von Ossietzky University, Oldenburg, Germany.

Symposium 13  
Surface Functionalization

Sponsoring Divisions: Division 1, Analytical Electrochemistry and Division 4, Electrochemical Materials Science

Symposium organizers  
**Gérard Bidan**, (Coordinator) INAC/CEA-Grenoble, France, **Jean-Christophe Lacroix**, ITODYS, Université Paris 7, France, **György Inzelt**, Faculty of Science, Eötvös Lorand University, Hungary, **Roberto Salvarezza**, Universidad Nacional de La Plata, Argentina

**62<sup>nd</sup> 2011 September 11-16 in Niigata, Japan.**

**Division 4 is sponsoring and co-sponsoring four symposia**

**Symposium 3  
Electrochemical Micro & Nanosystem Technologies**

Sponsored by: Division 4, Electrochemical Materials Science and Division 5,  
Electrochemical Process Engineering and Technology

This symposium deals with broad aspects of devices, including sensors, energy / data storage devices, micro reactors, and system-oriented works. We invite contributions on broad aspects of electrochemical fabrication, analytical electrochemistry and use of devices and systems. Particular attention will be given to sensors/biosensors, energy- and data-storage devices and micro-reactors, for applications in environmental and health related areas. This symposium will deal with three aspects of micro and nanosystem technologies - electrochemical surface engineering, electroanalytical study of the intricate and intimate relations between structure and function, and applications of devices and systems. Fabrication methods include all techniques with the potential to achieve 2D or 3D nano- and micro-architectures either via dissolution or deposition approaches such as site selective cluster formation, selective dissolution/deposition, pore formation, nanorod/tube growth and etching, and other self-aligning processes. Studies using electroanalytical methods which describe or explain processes occurring within the interesting framework of 2D or 3D nano and micro-structures, including mass transport, electrochemistry, chemistry, surface interactions and (bio-) catalytic behaviours are invited.

**Symposium Organizers**

**Chee-Seng Toh** (Coordinator), National University Singapore ([cstoh@nus.edu.sg](mailto:cstoh@nus.edu.sg))

**Patrik Schmuki**, University Erlangen-Nuremberg, Germany

**Yasuhiro Fukunaka**, Waseda University, Japan

**Achim Walter Hassel**, Johannes Kepler University, Linz, Austria

**Takayuki Homma**, Waseda University, Japan

**Tetsuya Osaka**, Waseda University, Japan

**Symposium 9  
Corrosion and Surface Treatments**

Sponsored by: Division 4 , Electrochemical Materials Science

This symposium includes all aspects of corrosion and corrosion protection of steels, light metal alloys and other metallic materials, but will be especially focused on the various surface treatments for corrosion protection.

**Topics include but are not limited to:**

- New environment-friendly surface treatments for corrosion protection - Growth and characterization of chemically and electrochemically formed surface films
- Environmental degradation of surface-treated materials - Modeling of relationship between the structure of the surface-treated materials and the resulting performance properties
- Mechanisms of corrosion and corrosion protection of surface-treated materials
- In situ and ex situ characterization of surfaces enabling deep understanding of the processes of surface treatments and corrosion at micro- and nano-resolution.
- Advanced electrochemical techniques for studying corrosion and surface treatments

## **Symposium Organizers**

**Hiroki Habazaki** (Coordinator), Hokkaido University, Japan ([habazaki@eng.hokudai.ac.jp](mailto:habazaki@eng.hokudai.ac.jp))

**Shinji Fujimoto**, Osaka University, Japan

**Roland Oltra**, Université de Bourgogne, Dijon, France

**Sannakaisa Virtanen**, University Erlangen-Nuremberg, Germany

## **Symposium 10**

### **Metallization for Microelectronics, Photonics and Energy Conversion Devices**

Sponsored by: Division 4 , Electrochemical Materials Science

This symposium will address electrochemical processes used in the fabrication of 3-D interconnects for microelectronics, photonics, as well as current collectors for energy conversion devices. Issues related to electrodeposition over a wide range of length scales, from Cu on-chip metallization to through-silicon-vias (TSV) for chip stacking to circuit board and packaging applications will be the focus of this symposium. The extension of these methods and new materials to the metallization of optical and energy conversion devices, such as photovoltaic, current collector for 3-D batteries will also be examined. Papers exploring the chemistry, metallurgy, performance and reliability of these structures are encouraged. Processes such as electroplating, electroless deposition, chemical mechanical planarization, electropolishing, electrografting and electrophoretic deposition will be discussed. Contributions that expand our understanding of these processes and offer a view to their implementation and extendibility in fabricating intricate 3-D wiring architectures are of particular interest.

## **Symposium Organizers**

**Thomas. P. Moffat** (Coordinator), NIST, USA ([thomas.moffat@nist.gov](mailto:thomas.moffat@nist.gov))

**Masanori Hayase**, Tokyo University Science, Japan

**Hideo Honma**, Kanto Gakuin University, Japan

**Yosi Shacham-Diamand**, Tel-Aviv University, Israel

## **Symposium 7**

### **Fuel Cells: Materials, Properties and Mechanisms**

Sponsored by: Division 3, Electrochemical Energy Conversion and Storage, Cosponsored by Division 4.

Fuel cells (FCs) represent a viable energy conversion technology capable of delivering electrical energy at high efficiency. FCs provide power in FC-vehicles, stationary and portable power applications. Although many demonstration units and prototypes for various applications have been already tested, fundamental limitations in the basic science still exist that impede ubiquitous implementation. The focus of this symposium will be to explore and debate these limitations and potential solutions. Basic understanding of degradation mechanisms and performance limitations, and major advances in materials science from the nano-to-macro scale will be covered, along with new solutions to diagnostic challenges. Financial support from NEDO for this symposium is greatly appreciated.

## **Symposium Organizers**

**Robert Kostecki** (Coordinator), Lawrence Berkeley National Lab, USA ([r\\_kostecki@lbl.gov](mailto:r_kostecki@lbl.gov))

**Teruhisa Horita**, AIST, Japan Anthony Kucernak, Imperial College London, UK

**Hiroyuki Uchida**, Yamanashi University

**Masahiro Watanabe**, Yamanashi University, Japan

## **Sponsored External Meetings 2010-2011**

**10<sup>th</sup> Int'l Symposium on Passivity of Metals and Semiconductors**, Florianopolis, Brazil, April 10-14, 2011.

**Fray International Symposium**, Nov 27-Dec 1, 2011, Cancun Mexico

**2nd Regional Electrochemistry Meeting of South-East Asia (REMSEA) 2010**. November 16-19 (2010), Bangkok, Thailand.

**6<sup>th</sup> ECHEMS Meeting: Electrochemistry in Interfacial Nanoscience**, June 20-23, 2010, Sandbjerg Estate, Denmark

**International Conference on Electrified Interfaces 2010**, June 20-25, 2010 Hobart and William Smith Colleges Geneva, New York.

**Next Generation Battery Materials**, June 17-19, 2010, Delmenhorst, Germany.

**8<sup>th</sup> International Symposium on Electrochemical Impedance Spectroscopy**, June 6-11, 2010, Carvoeiro, Algarve, Portugal

**2<sup>nd</sup> International Conference on Functional Nanocoatings**  
March 28-31, 2010 Dresden, Germany

**Conservation of Archaeological and Historic Metallic Artifacts: The need for Electrochemical Techniques**, January 11-15, 2010, Leiden, The Netherlands

**EuroInterfinish 09**, Sept 23-24, 2009, Bremen, Germany

**International Fischer Symposium, Main Topic 2009: "Electrochemistry and Microscopy"**, Benediktbeuern, Germany, 26-31 July 2009.

## Awards

### **Hans-Jürgen Engell Prize**

The Hans-Jürgen Engell Prize is awarded annually to a young electrochemist on the basis of published work in the field of corrosion, electrodeposition or surface treatment. (Applications for the 2011 due between February 1st and May 1st, 2011.)

*Winner 2009: **Karl Mayrhofer**, Technische Universität München, Germany*  
(Lecture was given at 61th Annual Meeting 2010, September 26-Oct 1, Nice France)

Respectfully submitted  
Tom Moffat  
Chair, Division 4