DC Meeting Highlights

Washington, DC was a popular ECS meeting venue this fall, with nearly 2,000 in attendance. A program of 1,576 papers presented in 34 topics ranged from a special tutorial symposium, "Leadership and Entrepreneurship in Electrochemical Engineering" (see story on page 17) to the always popular Student Poster Session (see story on page 51). Six Short Courses, a Technical Exhibit, and a plenary session with two talks, were just some of the special draws of this meeting.

Bernard Meyerson *(third from left), Vice-President for Strategic Alliances and Chief Technology Officer of IBM's Systems and Technology Group, delivered the* **ECS Lecture** *at the Plenary Session in Washington, DC on Monday of meeting week. Joining Dr. Meyerson were (from left to right):* **Robin Susko**, *of IBM and ECS Past president; ECS President* **Barry R. MacDougall**; *Meyerson; and ECS Executive Director* **Roque Calvo**.

All photos in this story are by Eddie Arossi Photography, Washington, DC.

Plenary Session

The ECS Lecture, given by **Bernard Meyerson** of IBM, was entitled, "The Origins of and Imperative for Green IT." Dr. Meyerson (a National Academy of Engineering member) is Vice-President for Strategic Alliances and Chief Technology Officer of IBM's Systems and Technology Group. The plenary speaker was introduced to a packed audience on Monday morning by Barry R. MacDougall, Society President. The main theme of this lecture was how green information technology (IT) has progressed from being "nice to have" to an integral part of the corporate DNA.

Dr. Meyerson began his fast-paced lecture with a snapshot of the electronics industry. In his view, classic CMOS scaling (as embodied by Moore's law, see *Interface*, spring 2005) breaks down because atoms do not scale. With modern oxides, one is at the 10-12 angstrom thickness regime and if you are scaling that to 2.5 atoms, you are getting into nuclear fission! He joked that he needed to get out of there at that point for personal safety. On the other hand, innovations such as strained silicon, high-k-dielectrics, multi-airgap wiring, on-chip wiring, and 3-D integration and magnetic racetrack memory will move the technology ahead. He calls this paradigm gain by innovation instead of gain by scaling.

The speaker next addressed the economics of R&D and the fact that research outlays were becoming prohibitive in terms of a company-localized model. Strategic alliances were the key in his crystal ball. He mentioned the collaborative research model involving IBM and SUNY at Albany. IBM has also undertaken such "co-opetition" alliances with Toshiba and Sony on the Cell microprocessor design project.

The talk then focused on the core issue of power demands to run computer systems. In cooling and running servers, ~80% of power is wasted. "Where has all the power gone" (as in the '60s folk song) has become the recurrent theme and a pie chart underlined that a substantial total fraction of the power input is for data center cooling. The solution/innovation approach taken by IBM was to adopt multi-core processor designs. The BlueGene/L supercomputer, the world's fastest system, features a two-core chip with each core running at a leisurely 800 MHz. This unit turned out to achieve a one-hundred-fold reduction in footprint (relative to the previous fastest supercomputer, NEC's Earth Simulator) while running at 1/28th the power. Another example of gain through innovation was the Cell microprocessor design, which is being used for medical imaging (Mayo Clinic), seismic predictions (China Grid), and Monte Carlo simulations (banking industry).

In this writer's (KR) recollection, this talk must rank among the more entertaining, informative, and fast-moving examples that have graced the ECS plenary sessions in recent years.

Olin Palladium Medal Award Lecture

This lecture by the award winner, **Sergio Trasatti** of the University of Milan, Italy, was entitled, "An Excursion into the Heart of Electrochemistry." Professor Trasatti is a pioneering electrochemist whose work has shed light on many diverse concepts in physical electrochemistry ranging from single electrode potential, electrocatalysis, and the electrochemistry of metal oxides. The speaker, who is currently the Editor-in-Chief of the journal, *Electrochimica Acta*, was introduced by Dr. Barry MacDougall. The lecture focused on the electronic energy of metals as the primary factor underlying a number of trends in the observed properties of electrified interfaces. Metal electrodes such as silver, copper, and gold in contact with aqueous media were discussed in terms of their potential of zero charge-work function relationships and surface crystal plane orientation effects. These aspects have considerable importance in electrocatalytic applications of metal electrodes.

Two other topics covered in this rigorous review included the physical meaning of electrode potentials and a detailed comparison of metal/vacuum and metal/solution interfaces. Both polarizable and non-polarizable interfaces were considered in an analysis of electrode potentials and in the second topic it was shown how the metal work function was modified by solvent

The 2007 ECS Olin Palladium Award was presented to **Sergio Trasatti** *(center) by ECS President* **Barry R. MacDougall** *(left). On hand to congratulate the medalist was a representative from the Olin Corporation,* **David Cawlfield** *(right). Established in 1950, the award is given for distinguished contributions to the field of electrochemical or corrosion science.*

The 2007 **Carl Wagner Memorial Award** *was presented to* **Philip N. Bartlett** *(right) by ECS President* **Barry R. MacDougall** *(left). The award is given to recognize mid-career achievement and excellence in research areas of interest to ECS, and for significant contributions in the teaching or guidance of students or colleagues in education, industry, or government.*

interactions. The final aspect of the lecture dealt with oxide electrode surfaces and surface acid-base dissociation phenomena. Electrochemical charge transfer rate constants were compared for disparate electrode surfaces including platinum, gold, born-doped diamond and ruthenium oxide.

The electrochemical properties of oxide electrode materials are gaining considerable traction in terms of the recent interest in electrochemical capacitors and Prof. Trasatti's work in this area has laid much of the foundation for later developments. The speaker ended his lecture by generously acknowledging the contributions of some 200 students, laboratory visitors, and postdoctoral fellows over a career spanning four decades. This lecture was eloquent testimony to the importance of Sergio's Trasatti's fundamental contributions to electrochemistry and the Society has recognized this by bestowing the medal to a most-deserving candidate.

At the fall meeting in Washington, DC, ECS President Barry R. MacDougall introduced the two newest **ECS Honorary Members**. *Pictured in the left photo is* **Barry MacDougall** *(left) and Honorary Member* **John S. Newman**; *pictured in the photo at right is President MacDougall (right) and Honorary Member* **Jerry M. Woodall**.

Sunday Lecture: XYZ for the Rest of Us…

This latest edition of the lecture series, entitled, "Understanding Non-Conventional Photovoltaic Cells," was given by **Laurie Peter** of the University of Bath in the United Kingdom. The split-screen configuration in the cavernous hall caused much mirth at the talk outset when the speaker noted that he was going to do a harmonic oscillation between the simultaneous PowerPoint projections on the two screens! Relative to the well-known solid-state solar photovoltaic (PV) devices, two less conventional types

Paul A. Kohl *(left) received a special commendation from President* **Barry MacDougall** *(right), for his many years of service as Editor of the* Journal of The Electrochemical Society. *Dr. Kohl was also the founding Editor of* Electrochemical and Solid-State Letters *and the first editor of* Interface.

of solar cells have received considerable attention in recent years: dye-sensitized solar cells (DSSCs) and plastic (organic) PV devices. The efficiencies have reached levels (~11% and ~5% respectively) on a laboratory scale that show these devices to have potential for technological realization with further optimization. Prof. Peter pointed out that both types of devices have interpenetrating contiguous phases in both cases involving electron and hole conduction. Thus the game is "all about interfaces" in both cases.

The subsequent talk focused almost solely on DSSCs. A variety of aspects related to DSSCs were covered in this lucid tutorial lecture including the history of this technology, how the device works, how to make a DSSC, and limiting components [such as the dye, redox electrolyte (hole transport agent)] and processes such as electron collection, dye regeneration, and redox shuttling at the counter-electrode. Recent innovations such as the replacement of: (a) the dye with semiconductor quantum dots; (b) the redox electrolyte with room-temperature ionic liquids and gels; and (c) titanium dioxide with other oxide semiconductors were then outlined.

The lecture then focused on the kinetics aspects and on the DSSC parameters such as the open-circuit photovoltage and the (short-circuit) photocurrent. A brief glimpse into modeling approaches (e.g., Monte Carlo simulation) was given along with techniques for the analysis of DSSCs such as intensity-modulated photocurrent and photovoltage spectroscopy. All in all, this talk triggered much interest and many questions in the diverse audience that attended this lecture, even given that this was a "leisurely" Sunday evening and the frenetic week had not yet begun.

The **2007 Class of ECS Fellows** *was recognized by President* **Barry MacDougall** *at the Plenary Session at the ECS fall meeting. Pictured from left to right are:* **Dennis G. Peters**, **Daniel A. Scherson**, *(President MacDougall),* **Eric D. Wachsman**, **Simon S. Ang**, *and* **James M. Fenton**. *Unable to attend the ceremony in Washington were new Fellows* **Marc Cahay** *and* **Viola Birss**.