

Seção Brasileira— Brazilian Local Section News

by Gessie Brisard

As a past chairman (2000-2001) of the Council of the Local Sections, I was very pleased to see, and participate in, the birth of a new ECS Local Section. The formation of the first South American ECS Local Section was definitively launched in Brazil in August 2000. The proposal was presented at the Council of the Local Sections committee during the ECS meeting in Phoenix in October 2000, and all the appropriate committees and the Board of Directors approved this new Brazilian Local Section (BLS).

For their first activity, the logo of the ECS BLS was put on display during a national meeting. The chairman, Ernesto R. Gonzalez, introduced the BLS to the electrochemists in Brazil during the opening night ceremony of SIBEE XII: Simposio Brasileiro de Eletroquímica e Eletroanalítica, held April 22-26, 2001, in Gramado in the state of Rio Grande do Sul. This well-attended symposium is organized every two years in Brazil and this year more than 300 papers were presented. The main objective of the BLS is to promote electrochemistry in all states of Brazil, by organizing short scientific meetings during the year, and supporting or participating in bigger events in Brazil related to solid-state and electrochemical science and technology.

The BLS will emphasize student participation by encouraging poster sessions and granting award certificates for the best student presentations at those meetings. The first certificates were given during SIBEE XII. Students presented approximately 120 posters in five different categories.

The future activity of the BLS will include a full day symposium at UNICAMP in Campinas this fall, and will be organized by Maria Auxiliadora Oliveira from ITA (São José dos Campos). All future activities, awards, and news of the BLS will be available on the ECS website very soon.



Student Poster Session Winners—(from left to right) **ERNESTO R. GONZALEZ**; **E. Y. IONASHIRO**, from IQ-UNESP, Araraquara (SP), for his work in fundamental electrochemistry (co-authors G. R. Souza, E. Milare, A. V. Benedetti, and F. L. Fertonani); **JULIANE CRISTINA FORTI**, from DQ/FFCLRP-USP, Ribeirão Preto (SP), for her work in electrocatalysis (co-authors P. Olivi and A. R. de Andrade); **R. P. DA SILVA**, from IQ-USP São Paulo (SP), for his work in electroanalytical chemistry (co-author S. H. Pires Serrano); and **Fritz HUGUENIN**, from IQSC-USP, São Carlos, for his work in conducting polymers (co-authors M. Malta, P. Pizzolato, and R. Torresi). **W. A. ARAUJO** (missing from the picture), from EQ-UFRJ, Rio de Janeiro (RJ), received an award for his work in corrosion (co-authors O. R. Mattos, I. C. P. Margarit, M. Ferreira, and P. de Lima Neto).



First officers of the new Section—(from left to right): **FRANCISCO CARLOS NART**, IQSC-USP, São Carlos, Member-at-Large, 2nd Treasurer; **GERMANO TREMILIOSI FILHO**, IQSC-USP, São Carlos, Treasurer; **ANTONIO C. DIAS ANGELO**, UNESP-Bauru, Member-at-Large, 2nd Secretary; **JOELMA PEREZ**, UNESP-Bauru; **Gessie Brisard**, elected Councillor for the period of her stay at IQSC-USP, São Carlos; and **ERNESTO RAFAEL GONZALEZ**, IQSC-USP, São Carlos, Chairman. Missing from the photograph are **MARIA AUXILIADORA OLIVEIRA**, ITA, São José dos Campos, Vice-Chairman; and **ANETTE GORENSTEIN**, UNICAMP, Campinas, Secretary.

Chicago

The Section held a meeting on February 21 at the Illinois Institute of Technology which featured Dr. Richard Alkire, former ECS president, and professor of chemical engineering at the University of Illinois Urbana Campus. Dr. Alkire presented "Prediction of Shape Evolution for Microelectronic Applications Involving Electrodeposition, or The Science and Mythology of Additives and What to Do When You Can't Tell the Difference." Making rapid and concurrent improvements in scientific understanding, as well as engineering design, requires strategic use of information technology and high performance computing tools. Recent results that use a suite of tools

were discussed including: AFM measurement of surface roughness evolution during copper electrodeposition with additives; scaling methods for building mechanistic hypotheses of additive effects; Monte Carlo simulations of roughness evolution using a distributed Condor flock of computers; parameter sensitivity methods for identifying the best working hypothesis; and coupled discrete/continuum numerical simulations that link surface events to current and potential distribution phenomena and the prediction of shape evolution.

Georgia

The Section meeting was held on February 6, at Georgia Institute of

Technology. Professor Jan Talbot, current ECS President, gave a seminar entitled "Electrocodeposition of Composite Films Using a Rotating Cylindrical Electrode." Her studies were carried out with a rotating disk electrode to define the hydrodynamic conditions at the electrode surface. The model system copper and alumina particles (0.5 to 5 micrometers in diameter) was selected for this study. The key process variables governing particle incorporation were the current density normalized to limiting current density, and the fractional loading of the film normalized to the solution loading. The anomalous behavior as a function of current indicates an increasing concentration of

(continued on next page)

Council of Local Section Officers



Walter A. van Schalkwijk, chairman of the Council, received his BS in chemistry from the Lowell Technological Institute (now the University of Massachusetts at Lowell) and his PhD in electrochemistry from the University of Ottawa where he worked under the direction of Brian Conway. Dr. van Schalkwijk has been in the battery industry for 20 years and is an internal consultant for SelfCHARGE Inc. of Redmond, WA. He joined SelfCHARGE when its operations merged with Power Sciences Inc. Prior to moving to Seattle, he was Research and Product Development Manager at Moli Energy Ltd., in British Columbia. His research interests include advanced algorithms for battery charging and the use of magnetic fields for non-invasive monitoring of battery state-of-charge, state-of-health, and other chemical and electrochemical reactions. He also works with Advanced Renal Technologies of Seattle on new kidney dialysis formulations and monitoring methods. He is active in consultation with emerging technology companies in the Pacific Northwest. Over the past few years, van Schalkwijk has been active in the Pacific Northwest section serving as vice-chairman and most recently as chairman. He recently completed terms as Division Advisor to the Luminescence and Display Materials and Energy Technology Divisions. He is presently the chairman of the New Technology Subcommittee and organized the First International Symposium on Electrochemistry and Solid-State Science in Medicine for Phoenix in 2000. Dr. van Schalkwijk is a past winner of the Student Research Award of the Battery Division.



Petr Vanysek, vice-chairman of the Council, was born and educated in Czechoslovakia, where he received his MS in physical chemistry from Charles University in Prague in 1996. He received his PhD while working on the electrochemistry of liquid/liquid interfaces under the leadership of Prof. J. Koryta, at the Czechoslovak Academy of Sciences in 1982. His postdoctoral experience included an 18-month research at the University of North Carolina and a year as a faculty-in-residence at the University of New Hampshire. He has been a regular faculty at the Department of Chemistry and Biochemistry at Northern Illinois University since 1985. In 2000, he took an extended leave from his academic duties and joined the research forces at Aclara Biosciences in Mountain View, California, as principal scientist.

Dr. Vanysek's research interests are in the physical and electroanalytical aspects of interfaces between immiscible solutions, studies of corrosion, instrumentation, and development of (mostly electrochemical) sensors. He is focused on detailed understanding of interpretation of impedance. His publication list includes about 90 papers in electrochemistry.



Christina Bock, secretary of the Council, is a Research Scientist at the National Research Council of Canada, Ottawa, where she has been on staff since 1997. She received a BS in chemistry/chemical engineering from the Technikum Winterthur, Switzerland in 1991, where she subsequently spent one year teaching and supervising laboratories in the physical chemistry department. She then obtained a PhD in physical and analytical chemistry at the University of Calgary, Canada in 1997.

Her research interests are directed toward electrocatalysis, in particular oxidation of organics for waste water treatment and direct methanol fuel cells. She is involved with industrial as well as fundamental projects, and has been active in identifying anode catalysts for the oxidation of organic toxins and fuels. As well as electrochemical techniques, she has used techniques such as XPS, Auger, TEM, and ellipsometry in her research.

Dr. Bock has been serving on the executive committee of the ECS Canadian Section since 1998 and is currently the vice-chairperson for programs. She organized a one day symposium on "Energy and the Environment" for the Canadian Section at the National Research Council Canada in the fall of 2000.

Local Section News

(continued from the previous page)

particles that allows one to make layered films of differing composition. This opens up the intriguing opportunity of building gradient films. In addition, the results demonstrate the highest level of particle loading for alumina/Cu yet reported. The codeposition of these materials is also of commercial interest for high heat transfer ceramic surfaces, commercially known as Glibcop. After the seminar, Dr. Talbot presented an informative update of ECS news and membership.

National Capital

The Section met on February 27 at the U.S. Naval Academy in Annapolis, MD. The speaker for this luncheon meeting, held jointly with the Baltimore-Washington Section of NACE International, was Paul Trulove, Program Manager of the Surface and Interfacial Science Task Force (Chemistry & Life Sciences Directorate) at the Air Force Office of Scientific Research (AFOSR). Dr. Trulove's talk, titled "Air Force Interests in Electrochemistry," addressed the critical role played by electrochemical science in dealing with some of the current challenges and future needs of the Air Force. Particular emphasis was directed toward the topics of corrosion, power systems, and sensors; with some discussion as well on exploratory efforts in nanotechnology, including nanolithography, and nanoscale biomimetic design. In the area of corrosion, Dr. Trulove addressed the dual challenges of maintaining the viability of aging aircraft, while seeking safe and environmentally friendly alternatives to chromate primer coatings. Chromate coating systems have long shown great effectiveness in protecting aluminum airframes against corrosion, but the toxic and hazardous nature of chromate pigments/salts has brought about increasingly restrictive regulations and rapidly escalating costs for their use. Emphasis in the area of power systems has been to reduce the size of batteries without sacrificing performance. New 3-D electrode designs are under consideration, and alternative electrolytes have been a particularly active area of study, *e.g.*, solids, gels, and molten salts. Finally, research in the area of sensor science and technology is directed toward the development of nanoscale and/or biomolecular sens-

ing structures, which will be responsive to stimuli such as onset of corrosion, and variations in temperature and pressure.

The Section also met on March 28 at the Renaissance Washington (DC) Hotel, in conjunction with the 199th ECS Meeting being held that week at the same venue. The speaker for this evening meeting was Dr. John D. Broadwater, manager of the USS Monitor National Marine Sanctuary, and as a qualified diver, an active participant as well in restoration and preservation efforts. Commissioned in January 1862, the USS MONITOR was involved in the world's first naval conflict between ironclads during the American Civil War. After less than a year of service, it sank off the coast of North Carolina during a storm in 235 feet of water. Dr. Broadwater discussed the underwater archaeology and state-of-the-art marine technology used by the U.S. National Oceanic and Atmospheric Administration (NOAA) to preserve this part of American history.

Also discussed were the extensive contributions made by U.S. Navy divers in this challenging and sometimes dangerous work. Of particular interest to those in attendance were the spatially nonuniform effects of time and seawater exposure on the ship's structure, as well as some carefully designed and executed electrochemical restoration processes used on artifacts recovered from the site.

The Section held their first annual Student Night meeting on April 17 at the U.S. Naval Academy (USNA) in Annapolis, MD. The intent of this event was to acquaint students and their teachers with the Local Section and its members, and to enable Local Section members to become familiar with some of the abundant new science and engineering talent in the National Capital area. Four students presented their work: Charles Ferrer of the USNA (co-advisors: Profs. Angela Moran and Michelle Koul), spoke on "Optimizing the Strength and Stress Corrosion Cracking Resistance of Aluminum Alloys Used for Refurbishing Aging Aircraft;" Jackie Williams, (University of Virginia, advised by Prof. Robert Kelly) discussed her work on the morphology, elemental composition, and electrochemical properties of coating blisters on epoxy-coated AA2024-T3 aluminum; Karen Ferrer (University of Virginia, advised by Prof. Robert Kelly), presented "The Role of the Carbon Dioxide System in the Corrosion of Aircraft Lap-Splice Joints;" and Jason Lee (University

of Virginia, advised by Prof. Robert Kelly), discussed "The Investigation of Crevice Corrosion Using Computational Modeling and Microfabrication Techniques."

New England

The Section held their second dinner meeting on February 13 at Northeastern University. Dr. Shridhara Alva of Medisense Products, Abbott Laboratories, presented an overview of "Diabetes and Blood Glucose Monitoring Technologies." Dr. Alva discussed both light based and current based detection methods for glucose and glucose markers using enzyme and mediator chemistry. Chemical interferents to both methods and their chemistry were also discussed. Instruments offered by companies in the field were presented and their advantages and limitations discussed.

On March 13, the Section held a meeting in Medford, MA. The featured speaker was Professor Samuel Kounaves, of Tufts University, Department of Chemistry. Dr. Kounaves described in detail the research that his group conducted during the last five years on sensors intended for "Electroanalysis in Extraterrestrial Environments."

On April 10, the Section held a joint meeting with the TMS Society in Boston, MA. The featured speaker was Dr. R. Terry K. Baker, of Catalytic Materials, Ltd. Holliston, MA, who presented "Graphite Nanofibers: Architecture of Materials at the Atomic Level." Graphite Nanofibers (GNF) are produced from the catalyzed decomposition of certain hydrocarbons, C₂H₂, C₂H₄, and/or CO at temperatures over the 500-700°C range. The architecture of these materials is controlled by a variety of factors, including the nature of the catalytic entity, the reactant gas composition, and the temperature. The structure of GNF is one in which only edge regions are revealed. These sites are readily available for chemical and physical interactions. Applications of these new carbon materials include selective adsorption of hydrogen and also organics, energy storage, polymer reinforcement, and catalyst supports. By using GNF, it has been possible to produce catalysts that are more efficient and offer higher selectivities than traditional catalysts.

San Francisco (ES&T)

The Section had their February meeting in the form of a plant tour of

Macrometals in San Jose, CA. The president of Macrometals, William Ah Fong, gave a brief presentation and hosted a tour of the plant. Macrometals specializes in metalization of ceramics to manufacture many brazed ceramic-to-metal assemblies. The technology of Macrometals involves making metalization paints from tungsten and manganese powder, applying the paint on ceramic pieces, heating the pieces in hydrogen atmosphere, plating, brazing, and precision machining. The ceramic-to-metal assemblies are used for high voltage feedthroughs, viewports, rf windows, electron beam collectors, and traveling wave tubes. Their customers include the aerospace industry, the medical equipment industry (magnetic resonance imaging and electron beam machines), and many research organizations.

The Section had their March meeting in Hayward, CA. The presentation "Electrochemistry in Offshore Platforms and Subsea Production Systems," was given by Dr. Ken Jordan, previously with Shell Offshore Inc. The speaker talked about the experimental and modeling work on the corrosion of wire rope (for offshore drilling platforms) and umbilical cord (for subsea production systems) in seawater. The modeling takes into consideration variation of temperature, oxygen concentration, and pH of sea water with location and depth. Typically aluminum or zinc as the sacrificial anodes were used to protect the wire rope or umbilical cord for up to 30 years. Different designs and materials were compared. The knowledge acquired from this work was applied to the development of the first zinc-clad carbon steel umbilical cord used in the Gulf of Mexico. This resulted in great cost saving over alternative materials. Dr. Jordan ended his talk by showing some pamphlets and actual materials related to his work.

A joint meeting of the San Francisco ES&T and SSS&T subsections took place on April 18 in San Jose, CA. Dr. Carlton Osburn, 2000-2001 President of ECS, talked about the history and the future plans of ECS, including several events in the near future co-sponsored by ECS with other professional societies. The second part of the presentation was entitled "Electrochemical and Solid-state Science in ULSI Technology." Dr. Osburn started with "Moore's Law," describing both the recent history and most likely future roadmap of integrated circuit miniaturization. He described

(continued on next page)

Local Section News

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the scaling of IC chips. When the dimension of the circuit is reduced by a factor k , the density of transistor is increased by a factor of k^2 . Other characteristics, such as power consumption, frequency response, or current density of the circuit also change in a way predictable based on sound physics principles. Some changes are undesirable, such as higher current density in conductors. IC miniaturization raises challenges for semiconductor fabrication. Some examples in MOSFET are: thinner gate dielectric (that requires new material); shallower channel (that requires tight control of diffusion); and new insulator material around conductor on a chip. These challenges must be met if the industry is to continue making progress in the next decades. ■