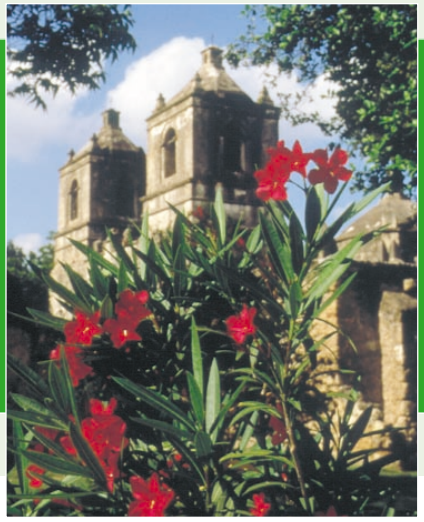
205th Meeting of

The Electrochemical Society



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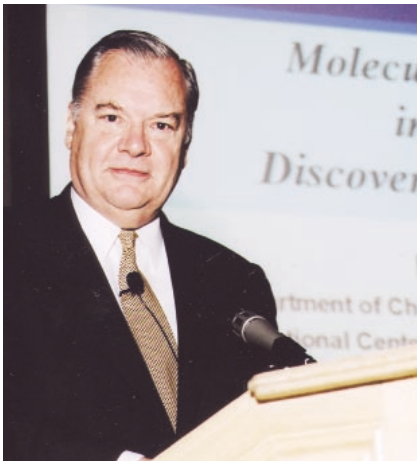
San Antonio Texas Meeting Highlights



***Richard Alkire** performed double duty at the meeting in San Antonio. On Monday, because of the unavoidable absence of the originally-scheduled speaker, Dr. Alkire stepped in at the last minute to deliver the meeting's plenary address.*

*On Wednesday, **Richard Alkire** (left) received the Society's 2004 Vittorio de Nora Award from ECS president **Bruno Scrosati**. The award is one of the Society's highest honors, and recognizes outstanding contributions in engineering and technology directed toward the utilization of electrochemical phenomena and processes.*

San Antonio meeting attendees enjoyed a warm welcome in Texas and at the ECS meeting at the Marriott Rivercenter. Over 1,100 participants enjoyed the special meeting activities within the hotel and at the famous Riverwalk just outside the hotel doors. The meeting warmed up on Sunday with a flurry of activity, including the very popular Sunday Evening Get-Together. Once the meeting officially opened on Monday morning, the first of the 943 presenters gave their talks in a total of 40 sessions. The Monday Evening Mixer showcased the work of students in poster sessions alongside an excellent technical exhibit.

At the Annual Society Luncheon on Tuesday, ECS President Bruno Scrosati noted that the year 2003 was a significant one for ECS, in which many Society records had been broken (see the 2003 Annual Report in this issue of *Interface*). Attendees at the luncheon meeting also voted to approve several amendments to the Society Bylaws. The changes enable greater flexibility in the communication with Divisions and Sections; change the name of the Contributing Membership Program to the Corporate Membership Program; and change the Society membership year from one where all members renew every January 1, to one where members renew on the anniversary of when they first became members.

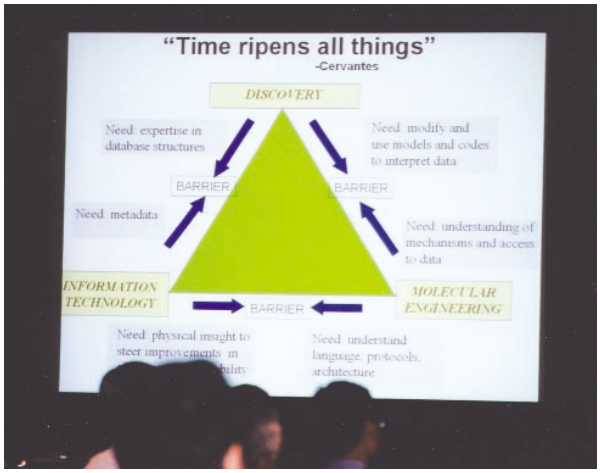
The Honors and Awards Session on Wednesday drew a large audience to hear the remarks of Richard Alkire, the 2004 Vittorio de Nora Award recipient. Dr. Alkire very graciously presented two major talks in San Antonio, including stepping in on Monday for the plenary lecturer, who unavoidably missed the meeting. (See below for a summary of his talks.) Dr. Alkire currently holds the Charles J. and Dorothy G. Prizer endowed chair at the University of Illinois. Also recognized at the session was Ronald Latanision, who received the Society's Henry B. Linford Award. Dr. Latanision is a principal and the practice director of Exponent's Mechanics and Materials practice and is based in Boston, Massachusetts. The Society also honored several editors, who have given of their time and expertise to make the ECS journals the two top-ranked journals in the field. Paul A. Kohl was warmly thanked for his efforts as the founding editor of *Electrochemical and Solid-State Letters*; and George Blomgren, Noel Buckley, Thomas P. Moffat, and Mordechay Schlesinger were honored for their significant contributions as associate editors.

Transistors to Integrated Circuits: Origins, Status, and Future Trends

Howard Huff, of International SEMATECH (Austin, Texas), presented an historical perspective of semiconductor devices as part of Sunday evening's "XYZ for the Rest

***Ronald Latanision** (left) received the Society's 2004 Henry B. Linford Award from ECS president **Bruno Scrosati**. The Linford Award is given to recognize excellence in teaching in subject areas of interest to the Society.*

of Us" lecture series. This talk was a veritable trip down memory lane that had something for both neophytes and specialists alike. The names of giants and pioneers in the field of semiconductor device technology — such as Mervin Kelly, Shockley, Bardeen, Gibney, Brattain, and Fred Seitz — flashed by on the screen along with their landmark discoveries. These were the heady days when the Bell Labs research groups ruled supreme in semiconductor science and technology. Of particular historical importance were the two "magic months" (Nov. 17-Dec. 16, 1947 and Dec. 24, 1947-Jan. 23, 1948) when key concepts and phenomena such as the field effect, surface states and band-bending, and inversion layer formation were first demonstrated and explained. Indeed, Dec. 16, 1947 was identified as an historic milestone marking the discovery of the field-effect transistor (FET) device. Dr. Huff's enthusiastic delivery style was effective in transporting the audience back to this exciting era that was punctuated by one "Nobel-quality" discovery after another. A related historical account and book review by Dr. Huff on the life and work of John Bardeen may be found in a previous volume of this magazine (*Interface*, Vol. 12, No. 2, summer 2003, p. 25).



A slide from Richard Alkire's award address.

Molecular Engineering in an Age of Discovery and Information—Part One

In an ECS meeting first (at least in this reporter's recollection) the original plenary speaker could not make it to the meeting because of weather-related transportation problems. Richard Alkire stepped into the breach admirably and very kindly agreed to provide a sneak preview of his Vittorio de Nora Award address (see below). The speaker was introduced by Bruno Scrosati, ECS president, who started by noting that Dr. Alkire needed little introduction to an ECS audience because of his long-standing service and contributions to the Society. (Dr. Alkire served as president of the Society in 1985-86. He received the Carl Wagner Award in 1985, was made an Honorary Member in 1991, elected Fellow in 1992, and received the Acheson Award in 1996.)

Dr. Alkire began his lecture by noting that his father was a musician from whom he had inherited his own keen musical interest and broad keyboard repertoire on piano and harpsichord. He also paid tribute to the support from his artist wife, Melissa Huff. One of the slides showed her work "Iris Rising," which embodied many of the elements of electrodeposition and surface finishing technologies.

The lecture took the audience back to the early days of the Society when it consisted of the chlor-alkali, aluminum, and electroplating "tribes." The speaker then noted that the 5 x 5 matrix with thermodynamics, kinetics, conductivity, mass transport, and current/potential distribution as the column "vector;" and aluminum, chlor-alkali, electroplating, batteries/fuel cells, and corrosion as the row "vector;" was now full with all the matrix elements fairly well understood. He noted evolving trends in electrochemical science and technology in the areas of instrumentation and novel materials and electrolytes such as ionic liquids. Dr. Alkire then described his approach to R&D problems: first identify the key elements of a problem and then solve it with a combination of modeling and experiment. His "pig plot" showing the concept of scaling was received with mirth and amusement by the packed audience present for this Monday morning talk. Dr. Alkire pointed out that engineers follow

(continued on page 18)

*Introducing Dr. Alkire was **Hariklia (Lili) Deligianni**, a former student of Alkire's and now with IBM's T. J. Watson Research Center.*

the markets and add science as they go. As an example of the research approach in the Alkire group the problem of on-chip Cu interconnects was briefly mentioned.

Dr. Alkire then switched gears and talked about the broader perspectives in scientific and technological endeavors. He talked about system complexity and star formation regions, NSF's Earthscope rollout, and grid computing in this context. He noted that while the spectacular advances in computing power were impressive, we should not lose sight of the importance of scientific data. He then showed a triangular diagram with discovery, information technology, and molecular engineering at the apexes with barriers interposed between the three pairs of elements of R&D endeavor.

A related account by Alkire and Chapman on "Perspectives on Electrochemical Engineering" that appeared in *Interface* (Vol.12, No. 4, winter 2003, p. 47) was cited by the speaker in his lecture and may be consulted for further details.

Four past ECS Associate Editors were honored for their contributions to the Society's journals. Receiving scrolls of appreciation were (from left to right): ***George Blomgren, D. Noel Buckley,*** *and* ***Thomas P. Moffat****. Missing from the photo is* ***Mordechay Schlesinger****.*

Molecular Engineering in an Age of Discovery and Information—Part Two

On Wednesday morning, immediately following the Honors and Awards ceremony, Dr. Alkire presented his Vittorio de Nora Award address. The awardee was introduced by one of his early graduate students, Hariklia (Lili) Deligianni of IBM, who pointed out Dr. Alkire's extensive contributions to our current understanding of phenomena at solid/liquid interfaces over many length and time scales, porous and resistive electrodes, electrodeposition and etching processes, and localized corrosion. She noted the unique approach of the Alkire group in blending experiments and simulation/modeling to attack problems spanning a very broad range of topics within electrochemical science and engineering. Finally, Dr. Alkire's mentoring philosophy of "you are here to explain and I am here to listen" served to foster the emergence of independent thinkers and leaders from his group.

Professor Alkire began by thanking his many students and colleagues over the years and also acknowledging his mentors, Charles Tobias and Carl Wagner. He quoted from Wagner the prescient statement in 1962 that "molecular engineering may be important in the future development of industrial electrochemical processes." He also noted that "truth" changes and what was true yesterday may not be true today, and he shared a humorous story involving his University of Illinois colleague, Harry Drickamer in this context. Apparently one student had gone to Professor Drickamer and wanted to know whether he planned to give the same examination that he had given before. Drickamer's response was that the exams would be the same but the answers would be different!

For his outstanding contributions as the Founding Editor of Electrochemical and Solid-State Letters, ***Paul A. Kohl*** *(right) received a scroll of appreciation from ECS president* ***Bruno Scrosati****.*

Dr. Alkire illustrated his R&D philosophy with two examples drawn from his work in electrodeposition and corrosion. He described how high performance computing could be used to integrate experimental data with multi-scale simulations to understand the very complex system of Cu electrodeposition from a bath containing additives. This problem has implications for interconnects in semiconductor device integration in terms of a fundamental understanding of how additives influence trench infill evolution. For a fuller description of the Alkire approach to this problem, a recent article (T. Drews *et al.*, *AIChE J*, **50**, 226, 2004) may be consulted. Dr. Alkire then discussed his group's studies on the initiation of corrosion pits in stainless steel (SS 304 samples). He described how these pits start at MnS inclusions on the steel surface. He noted that this problem was computationally challenging and the interplay of bulk- and micro-crevice formations meant coupled numerical simulations.

Professor Alkire concluded his award address with a reminiscent series of pictures taken with his group members and colleagues at gatherings in his residence over the years. He noted the international flavor of these parties and the fact that the cuisine was all the more enjoyable in terms of its variety. It was abundantly clear to many in the audience (including this reporter) why the students and post-docs have such fond memories of their tenure with the Alkire group. Clearly this was a telling example of how the scientific exchange between a mentor and the trainee can be made all the more rich by the human elements of an affectionate relationship. Perhaps there is a lesson to be learnt for all of us who aspire to be effective role models. ■

Meeting Highlights was prepared by ***Krishnan Rajeshwar*** *and* ***Mary Yess****, Interface's Editor and Managing Editor, respectively.*