

SEATTLE

MEETING HIGHLIGHTS



The Society's Meeting in Seattle had many lively technical symposia on different topics, but "offline," a universal theme of heated discussion was the coffee. Host Committee members were heard to expound on what constituted a "real" latté, or to go out on a professional limb to claim where to get the best brew in town. Back in the Meeting sessions, 1,477 attendees presented 1,145 papers in 33 symposia. Twenty-nine exhibitors displayed provided information and demonstrations in the Technical Exhibition. Other highlights from the Meeting included many jokes about the rain or "permadrizzle" in Seattle; and an interesting plenary lecture by Alan Miller that included a short speeded-up video on the making of a Boeing 777.

Plenary Lecture

Dr. Alan G. Miller of the Boeing Co. gave the plenary lecture entitled "Aerospace Materials for the 21st Century." A Boeing veteran of 20 years, he is currently the Chief Engineer of Boeing materials technology and is responsible for the corporate materials laboratory. His technical management responsibilities pertain to all materials and processes used in the commercial airline group products. These include R&D, design analysis, production and fleet support, and performance management. Following are excerpts of his talk in Seattle.

The electrochemical, and more generally, materials-related challenges in the aircraft industry can be broken down into three categories: near-term challenges include chrome-free and cadmium-free plating formulations and coatings. In the intermediate category would be the development of durable, regenerative passivating films for high-strength aluminum and steel alloys. Finally long-term developments would include active, conformal surface shaping for aerodynamics; smart surface films that facilitate *in situ* corrosion monitoring; and tailorable surface finishes on the aircraft exterior that would facilitate, for example, on-demand and reversible alterations in logos and visual appearance. The last-named application addresses the projected trend in the airlines industry of sharing of infra-structure and support systems. Thus it is conceivable and intriguing that a passenger boards an Air Canada jet in North America and then lands in a Lufthansa carrier in Europe!

The drivers for materials development are range, fuel consumption, aging, and fare with the three figures of merit being performance, maintenance, and cost. The new Boeing 777 aircraft features new alloys and composites derived from Al (70%), steel (11%), titanium (7%), composites (11%), and miscellaneous (1%). Problems with current-generation materials were discussed including the rather poor corrosion-resistance of Al alloys coupled with the cost and weight of Ti alloys. New materials are sought that combine high fracture toughness with yield strength.

Corrosion prevention is another crucial area in aerospace technology that directly impacts on the electrochemical community. Current goals in this area revolve around Alodine replacement coatings because of the environmental concerns with hexavalent chrome. Two such new-generation coatings were discussed, namely cobalt conversion coating and another conversion coating based on the sol-gel approach. A third coating under development is a tungsten carbide-cobalt thermal spray formulation specifically for landing gear applications.

A unifying theme in Dr. Miller's talk was how aerospace materials provide an example of the benefits of an integrated-technology approach where materials science/engineering, corrosion science, and chemistry all contribute in a synergistic manner to provide effective solutions to commercial demands.



Scenes from a Meeting—Alan G. Miller (top photo) during his Plenary Lecture. ECS President **Gerard Blom** (center photo, left) presents a scroll to **Barry Miller** to commemorate Miller's election as an Honorary Member. **Walter van Schalkwijk**, (bottom photo) Chairman of the Host Committee welcomes attendees to the Seattle Meeting.

Solid-State Science and Technology Award Address

Dr. Isamu Akasaki presented the Solid-State Science and Technology Award address entitled "Renaissance and Progress in Nitride Semiconductors—Seeking Blue Emission." Dr. Akasaki is currently a project leader at Monbu-shu High-Tech Research Center in Meijo University. Dr. Akasaki's talk revolved around Group III nitrides namely AlN, GaN, and InN. Ternary alloys such as GaInN and AlGaIn were also discussed. He first gave a history of LEDs and laser diodes. The three main application areas of nitrides are in photonic devices, electronic devices, and electron emitters. LEDs based on these materials were first discovered around 1975. A hiatus followed thereafter with another growth spurt that began around 1986. The latter time frame coincided with the development of a low-temperature buffer layer for the growth of nitride crystals on sapphire substrate.

Two problems plagued this technology until the 1980s: poor crystal quality and poor conductivity control. For example p-type conductivity had never been realized up till then. Magnesium doping facilitated the fabrication of p-n junction devices. This new development featured the use of low energy electron beam irradiation (LEEBI). The rapid growth in the field after around 1990 has featured the development of buffer layers on a commercial scale, stimulated emission by electron injection, and a blue-green emitting laser diode with stable output for 10,000 hr. Up to 13% (external efficiency) LED devices have been demonstrated. The final topic discussed was a comparative perspective of fabrication methodology including MOVPE, HVPE, and MBE. As with the plenary lecture, one came away from this talk with a reaffirmed appreciation of the fact that the congruence of several disciplines (solid-state physics, crystal growth, and organometallic chemistry) can create impressive technological advances. ■



The Non-Technical Registrants—(top photo) participated in a full program that included talks and tours. **Visitors to the Technical Exhibition** (center photo) saw demonstrations of some of the latest equipment and techniques. **Isamu Agasaki** (bottom photo, right) receives the Solid-State Science and Technology medal from ECS President **Gerard Blom**.

Board Highlights

- ▶ Cor L. Claeys, IMEC, Leuven, Belgium, was approved as an Associate Editor for the Society's technical journals. Dr. Claeys assumed his duties in May (see page 15).
- ▶ The Board of Directors approved the publication of a new addition to the Society's Monograph Series: "Electrochemical Systems," by John S. Newman. Dr. Newman is an Associate Editor for the Society's technical journals.
- ▶ The following award winners were announced: John B. Goodenough, 1999 Olin Palladium Medal Award; and Charles R. Martin, 1999 Carl Wagner Award. In addition, the Fellows were announced: Eric Brooman, Stanley Bruckenstein, Kathryn Bullock, Shimshon Gottesfeld, Yue Kuo, Dieter Landolt, Jerzy Ruzyllo, Ralph White, and William Yen.

Contributions to Meeting Highlights came from Krishnan Rajeshwar and Mary E. Yess, Interface's Editor and Managing Editor, respectively.