JERRY M. WOODALL (holding plaque) received the FMS National Materials Advancement Award in December 2002. Among those who came to honor him that day were (from left to right): ECS Executive Director Roque Calvo, past ECS president Joan Berkowitz, FMS president Lyle H. Schwartz, (Woodall), past ECS president Gerard Blom, current ECS secretary Paul Natishan, past ECS president Dale Hall, and FMS vice-president Iver E. Anderson.

Photograph by Mattox Photography, Washington, DC.

Jerry M. Woodall Receives National Materials Advancement Award

Longtime ECS member Jerry Woodall was presented with the National Materials Advancement Award from the Federation of Materials Societies (FMS) last December. A pioneer in the research and development of compound semiconductor materials and devices, Woodall is currently the D. Baldwin Sawyer Professor of Electrical Engineering at Yale University. Dr. Woodall became a Society member in the 1960s and was active in the Electronics Division, serving as chairman and as a *Journal* divisional editor. He was co-founder of the Energy Technology Group (now a Division), and served as Society president for the term 1990-1991. He received a number of awards from ECS, including the 1980 ECS Electronics Division Award, the 1985 Solid State Science and Technology Award, and was elected as a Fellow in 1992. He recently received a National Medal of Technology (see *Interface*, winter 2002, p. 21).

The FMS National Materials Advancement Award "recognizes individuals who have demonstrated their outstanding capabilities in advancing the effective and economic use of materials and the multidisciplinary field of materials science and engineering generally, and who contribute to the application of the materials profession to national problems and policy."

Previous recipients include Morris Cohen, Institute Professor Emeritus, MIT (1988); Rep. George E. Brown, Jr., Chairman of the House Science, Space, and Technology Committee (1992); Lyle H. Schwartz, Director of Materials Science and Engineering Laboratory at the National Institute of Standards and Technology (1993); Nathan E. Promisel, retired Director of the National Materials Advisory Board (1994); Mary L. Good, Under Secretary of Commerce (1996); Robert Baboian, retired Fellow of Texas Instruments (1998); and Mildred S. Dresselhaus, Director, Office of Science, U.S. Department of Energy (2000).

The Federation of Materials Societies is a consortium of technical and professional societies and associations whose constituencies include scientists, engineers, and other professionals active in the areas of materials policy as well as R&D, processing, manufacturing, recovery, and resource availability. On the web at www.materialsocieties.org. ■

In Memoriam

Else Kooi
1932-2001

Dr. Else Kooi, born in Lutjegast, The Netherlands in 1932, passed away on September 14, 2001, in Los Altos, CA. A very moving memorial service was held at the Union Presbyterian Church of Los Altos on September 21, 2001. He is survived by his wife Nellie, four children, and five grandchildren.

After finishing his studies in chemistry and mandatory military service, Dr. Kooi worked at Philips Electronics in Research, initially in Eindhoven and then in America for the rest of his career. His initial research at Philips in Eindhoven was on germanium alloy transistors (a major market strength for Philips), after which he started working on silicon alloy transistors, inasmuch as silicon was rapidly replacing germanium. The advent of the planar process, however, quickly supplanted all other transistor fabrication methodologies.

Dr. Kooi then began working on the oxidation of silicon and methods for the identification and reduction of the ionic instabilities due to sodium ions. His research during those years also included the significant substantiation of Pieter Balk's research of the benefit of a post-oxidation anneal in an appropriate ambient to reduce the residual interface states at the silicon-silicon dioxide interface. It was during these investigations with Jo Appels that Kooi discovered the masking action of silicon nitride in suppressing the oxidation of silicon. Kooi clearly comprehended the benefit of utilizing a (pad) oxide between the nitride and silicon to reduce dislocation formation in the silicon. This research evolved into the local oxidation of silicon (LOCOS) methodology, published in 1970, the mainstay for MOS and CMOS integrated circuit (IC) manufacturing for more than thirty years. A variant of the LOCOS process, furthermore, enhanced the retention of the silicon-silicon dioxide surface planarity for making reliable interconnect patterns and, in conjunction with subsequent silicon gate technology, resulted in the self-aligned features of silicon gates for definition of the gate, source, and drain regions within the device area (and later self-aligned contact MOS-SACMOS). The description of the bird's beak and bird's head phenomena was explicated by Kooi, as was later research in the mid-1970s describing the reaction of nitrogen diffusion through the oxide in the interfacial region between the field oxide and the nitride/oxide region, often described as the "white ribbon effect."

Over the years, a host of investigators extended the basic process, such as the utilization of a polysilicon layer between the oxide and nitride layers. Only now has shallow trench isolation proved a formidable alternative in extending IC fabrication to the 130 nm technology node (physical gate length of 90 nm).

Dr. Kooi was promoted to Research Group Manager and, shortly thereafter, to Deputy Director in the Chemistry Department at Philips Research in Eindhoven. When the Philips Research Laboratories, Sunnyvale (PRLS) was established in California in 1979, Kooi was named Director, the position he held until his retirement in 1992. It was during this time (1979) that two of us (HRH and DL) initiated our extensive working relationship with him. The Advanced Development Facility of Signetics was absorbed into PRLS after a few years, in the course of which a joint facility was utilized for MOS development, providing facilities on an industrial scale to ensure compatibility with the production fabs.

Dr. Kooi was awarded a number of honors, including the prestigious IEEE Cledo Brunetti award in the early 1980s. He wrote the first volume in the IEEE's Case Histories of Achievement in Science and Technology entitled *The Invention of LOCOS*[1], reviewed by HRH[2]. The gems of insight are abundant in this slender volume. Several examples clearly noted are the non-linear progression of science, opposite to the portrayal as often suggested in the popular press, as well as the trials and tribulations in the explication of a new phenomenon. Early on, Kooi understood that "semiconductor devices cannot be considered fully developed before they have been proven reliable."[1,2]

Perhaps Kooi's greatest strength was the ability to challenge his colleagues in their research in a non-confrontational and skillful manner, often with a twinkle in his eyes. His skilled questions, always asked with an inquiring, humorous approach, invariably brought out the best of his colleagues. But his approach should not be misunderstood; behind this scientific, collegial atmosphere was an iron-clad inner discipline to help ensure the achievement of our common goals and responsibilities. Else Kooi is severely missed by his colleagues throughout the world. ■

This notice was contributed by Howard R. Huff (International SEMATECH), Albert Schmitz (retired, Philips Semiconductors, North America), and Donald Liddie (retired, Philips Semiconductors, North America).

1. E. Kooi, *The Invention of LOCOS,* IEEE Case Histories of Achievement in Science and Technology, IEEE Press, NY (1991).
2. H. R. Huff, Review of the Invention of LOCOS by E. Kooi, *Circuits & Devices,* **9**, No. 6, 50-51 (1993).

In Memoriam

Phillip W. Morrison, Jr. (1960-2002)

Philip W. Morrison, Jr., Associate Professor of Chemical Engineering at Case Western Reserve University, passed away Monday, November 4, 2002 after a brief illness. Professor Morrison received his BS degree in chemical engineering from Princeton University in 1982 and his PhD from the University of California in 1987. He worked for Advanced Fuel Research Inc. and North Carolina State University before joining Case Western Reserve University in 1993.

Professor Morrison was a gifted teacher and a mentor to many undergraduate and graduate students. He won numerous awards and honors including the *Top Prof* award at Case Western Reserve University and a prestigious National Science Foundation Career Award. He was a four-time Wittke award nominee, a Glennan Fellow, and he served as advisor to the Cooperative Education Program of the Case School of Engineering. Professor Morrison was an acknowledged international expert in process monitoring using spectroscopic methods and performed research in such diverse areas as hazardous chemical waste disposal, carbon dioxide sequestration, and diamond synthesis. He was a member of the American Institute of Chemical Engineers, the American Chemical Society, the Materials Research Society, The Electrochemical Society, and the American Society for Engineering Education.

Professor Morrison leaves his wife, Nancy, and two children, Andrea (12) and Ian (5). Donations in his honor can be made to the Chemical Engineering BS/MS Scholarship Fund of Case Western Reserve University. ■

This notice was submitted by Peter Pintauro.

In Memoriam

Edgar C. Pitzer (1905-2002), member since 1946, Physical Electrochemistry.

Helmut E. Theirfelder (1922-2002), member since 1957, Battery.