



ECS Co-sponsored Events

Moore's Law at 40

This year marks the 40th anniversary of Moore's law, Gordon E. Moore's 1965 observation and prediction about the exponential growth in the power of semiconductor technology. Roughly put, Gordon Moore observed that semiconductor technology had doubled in power every year—an exponential curve—and predicted that innovation would continue this path. In 1975, he updated this to a doubling about every two years. History has thus far proven Moore correct; and today, global change marches to the beat set by the technology behind Moore's law.

On May 12 and 13, the Chemical Heritage Foundation (CHF) joined with ECS and the Eastern Technology Council to assess innovation's curve, its implications, and the role of the chemical sciences and technologies. This program was a unique opportunity to gain perspective on where we are, where we have been, and where we are going. On the evening of May 12, the program opened with a public lecture by Rodney Brooks, a pioneer in artificial intelligence and robotics, and the director of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL). Dennis Hess, ECS Past President and Editor of *Electrochemical and Solid-State Letters*, introduced Dr. Brooks through a whirlwind summary of ECS's substantial role in the history of solid-state science and technology. Dr. Hess also served as a moderator for the presentation by Elsa Reichmanis.

On May 13, a series of speakers spoke about innovations in the semiconductor industry and the role of chemical science and technology within it. Gordon Moore himself reflected on Moore's law, and he was joined by other prominent figures including: Patrick Gelsinger (Intel), Raj Gupta (Rohm and Haas), Carver Mead (California Institute of Technology), Elsa Reichmanis (Lucent Technologies), AnnaLee Saxenian (University of California, Berkeley), and Harry Sello (Harry Sello and Associates).

CHF President Arnold Thackray noted that, "the implications of this exponential curve of innovation have been, and will continue to be, profound.

Revolutions in telecommunications and information technology have allowed the formation of the global economy and networked societies, transforming work, travel, communications, and leisure. The discovery process for new therapeutics and medical technologies relies on computer processing power. Information processing is central to modern transportation, from engine control to air traffic control, and from containerized shipping to GPS location."

Rodney Brooks, director of CSAIL at MIT, and chief technical officer of iRobot Corporation, spoke about the cultural and social effects enabled by the semiconductor industry's realization of Moore's law across four decades. He talked about the social interactions, knowledge transfer, corporate strategy, and technological innovation. He discussed future trends in these areas and gave some fascinating examples of exponential growth in the fields of artificial intelligence and robotics.

Gordon E. Moore, chairman emeritus and cofounder of Intel, spoke about the underappreciated dimensions of Moore's law: the economic dimension of his observation and prediction; the way in which Moore's law has served as an explicit strategy for the semiconductor industry and become a self-fulfilling prediction; and the chemical and materials challenges involved in the past adherence of semiconductors to the curve of Moore's law, and its ability to do so in the future. Gordon Moore has been a member of ECS since 1957, and delivered two plenary lectures at ECS meetings (1981 and 1997).

Patrick P. Gelsinger, senior vice-president and general manager of the Digital Enterprise Group at Intel, presented a wide-reaching perspective on the impact of the semiconductor industry's realization of Moore's law. He spoke of the global developments driven by the semiconductor industry and of large-scale technological, economic, and social changes that have been enabled by the semiconductor industry's path of development.



GORDON E. MOORE, chairman emeritus and co-founder of Intel, addressed the special two-day symposium on "Moore's Law at 40." Moore is a long-time member of ECS and has delivered two plenary lectures at ECS meetings.



RODNEY BROOKS, Director of MIT's CSAIL and CTO of iRobot Corp., opened the event on May 12 with a talk on "The Age of Moore's Law: Cultural Perspectives, Societal Effects."



PATRICK GELSINGER, Senior Vice-President and General Manager of Intel's Digital Enterprise Group, spoke about Moore's Law, global perspectives, and the semiconductor industry.

ECS is an affiliate of the Chemical Heritage Foundation and was proud to be a co-sponsor of this very successful event. This event uniquely captured the experiences, the knowledge, and the perspectives of some of the major players in the field; and recorded them for the study of those innovation curves yet to come. ■

Ed. Note: Thank you to CHF—to Arnold Thackray for once again creating an excellent program, to Rob Lopata for his help in enabling ECS's co-sponsorship, and to Neil Gussman for help in preparing this article. For more information about CHF, visit them on the Web at www.chemheritage.org.

ISTC 2005

The ECS International Semiconductor Technology Conference was established in 2000. For the past four years, ISTC has been held in China and Japan. For the first time, in 2005, the ECS ISTC meeting cooperated with SEMI, the global industry association providing manufacturing technology and materials to the semiconductor and related micro-electronics industries.

The activities began on March 14 with a joint press conference of SEMI, ECS, the Fabless Semiconductor Association (FSA), and SSIA. The chair of SEMI, the president of ECS, and the executive director of FSA spoke at the press conference.

In the afternoon, ECS and SEMI have offered a series of technical courses and workshops. They included courses on the impact of lead-free technology on high density IC packages and SMT assemblies, as well as a session on CMOS nanoelectronics and the future of non-classical CMOS devices. In addition, separate courses covering CMP fundamentals and plasma technology were also very welcomed by the attendees.

On March 15, the conference started with a keynote session and a number

of distinguished speakers, including the CTO of Philips, the CEO of Novellus, the CTO of Jazz Semiconductor, and the senior vice-president of Chartered Semiconductor.

The heart of the ISTC2005 conference was the technical program. It consisted of six parallel technical sessions: Device Modeling and Reliability; Lithography, Materials, and Equipment; Advanced Processing; Manufacturing Science; and Chemical Mechanical Polishing Technology. The fields of solid-state science and technology are an important and fast-moving field in China. These technical sessions was designed to enhance the knowledge of the local Chinese semiconductor manufacturing factories and communities, and to provide unique opportunities and forums for the exchange of information on the latest scientific and technical developments. About 460 people attended this technical conference.



Enjoying the international reception at the Sofitel Jingjiang Oriental Hotel were (from left to right): MARK DING, President, SEMI China; TETSURO (TERRY) HIGASHI, Chair, SEMI Board of Directors and Chair/CEO of Tokyo Electron Ltd.; ROBIN SUSKO, IBM and ECS President; MING YANG, Chair ECS Asia; and STANLEY T. MYERS, President and CEO of SEMI.

On the evening of the 15th, ECS-Asia chair Ming Yang and SEMI China president Mark Ding co-hosted the international reception for SEMICON China special guests the in Jin Jiang Pudong Hotel. The SEMI president and ECS president both give their welcome speech during the reception.

More information regarding ECS ISTC and ECS Asia please visit www.ecsistc.org, www.ecsasia.org, or by calling ECS Asia at 86 (0) 21.6845.7589. ■



SWAMI MATHAD gave a short course on plasma technology.



SIMON DELEONIBUS gave a short course on CMOS nanoelectronics and the future of non-classical CMOS devices.



DAVID PICHENG HUANG gave a short course on CMP fundamentals and their industrial applications.