# Establishment of Division of Silicon Technology

Takeo Hattori
Former Chief, Division of Silicon Technology
The Japan Society of Applied Physics
E-mail : hattori@ipc.musashi-tech.ac.jp

This report introduces the Division of Silicon Technology (URL: http://si.tuat.ac.jp, email: secretariat@si.tuat.ac.jp), which was established two years ago as a central site for research activities focusing on silicon-based integrated circuit technology. Prior to that, the divisions in the Japan Society of Applied Physics were: Optics, Radiation Science, Solid State Physics and Applications, Thin Film and Surface Physics, Materials Science and Crystal Technology, Education in Applied Physics, Organic Molecular Electronics and Bioelectronics, Superconductors, and Plasma Electronics. These divisions individually selected and worked on relevant topics of silicon-based integrated circuit technology such as devices, processes, and materials. There was concern, however, that this approach would soon cease to work in the field of microfabrication of silicon-based integrated circuits. To explore a breakthrough, the Professional Group was newly organized three years ago in the Japan Society of Applied Physics, aiming at a comprehensive coordinated approach in the study of devices, processes, and materials related to silicon-based integrated circuits. After one year, the Professional Group was promoted to the Division of Silicon Technology as its membership rapidly grew. Initially, the Division consisted of the Lithography Committee, ULSI Device Committee, Silicon New Function Device Committee, Surface/Interface/Silicon Material Committee, and Multi-Level Interconnect System Committee. Since then, the Division of Silicon Technology has been actively promoting various research activities, and has continued to grow, with the Simulation and Modeling Committee being added in April 2000 and the Junction Technology and Silicon Nanotechnology Committees being added in September 2000. As of February 10, 2001, the Division of Silicon Technology was the third largest division in the Japan Society of Applied Physics, having a total of 671 members.

The Division of Silicon Technology organized and implemented various research activities in FY2000. Each of the eight Committees held its own research meeting. Also, two Committees jointly organized two research meetings. Miniature versions of the Spring and Fall Meetings were held twice, and these were open to members of the Division. Together with the ADMETA Committee, the Division of Silicon Technology organized Advanced Metallization Conference 2000: Asian Session on October 19 and 20, 2000 (with 44 papers presented and 118 participants). The Division of Silicon Technology held the first international workshop on junction technology in Asia on December 6, 2000 (with nine papers presented and 152 participants). The Division of Thin Film and Surface Physics and the Division of Silicon Technology jointly organized the sixth research meeting to discuss the formation, characterization, and reliability of ultrathin silicon oxide films on January 26 and 27, 2001 (with 64 papers presented and 155 participants).

Innovation in silicon-based integrated circuit technology has dramatically improved computer performance. High-speed information processing achieved by advanced computer technology, when combined with communication technology, has significantly stimulated the worldwide exchange of information. This change has opened up a new era of global civilization in which politics, economics, education, and culture influence each other across the world.

There are, however, some problems in silicon-based integrated circuit technology. Specifically, the lifetime of silicon-based integrated circuits is as short as ten years. Moreover, the effective lifetime is much shorter because integrated circuits of a given performance quickly become obsolete due to the rapid progress of technological innovation. As a result, an increasing number of electronic devices with embedded integrated circuits, such as computers, home appliances, and cellular phones, are becoming an unwanted legacy for future generations.

In Japanese culture, an important role is played by trees, whose characteristics have been studied to find their optimum use. Horyuji Temple in Nara, which is the world's oldest wooden structure, was constructed 1300 years ago and it has been registered as a UNESCO World Heritage site. It uses 2000-year-old Japanese cypress. The construction engineers who built Horyuji Temple inherited knowledge about tree lifetimes and techniques for building high-durability structures that had been handed down from one generation to another for 2000 years. Ancient engineers spent their whole lives orally handing down their knowledge and technology in order to build supreme structures that they could be proud of throughout history.

In order for humans to maintain prosperity for a long period of time, we must replace our conventional resource-wasting industry with a new resource-saving industry that focuses on reusing resources and we must manufacture electronic equipment that will remain valid and usable for generations to come. To do this, we must develop design concepts that enable products to evolve by incorporating new technologies and introducing an element of recyclability into the design of products and parts.

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