



In Memoriam Dr. Seiichi Denda: A Pioneer in the Field of Electronics Packaging in Japan

On September 11, 2023, Dr. Seiichi Denda passed away. Dr. Denda was one of the pioneer in the fields of both semiconductor and electronics packaging in Japan. In the 1950s, the idea of integrated circuits (IC) was proposed and “Micro Module” (RCA), “Molecular Electronics” (Westinghouse), and “Solid State Circuits” (TI), etc. were developed. Inspired by these developments in the USA, some Japanese research groups promoted to develop this type of ICs. The group of Yasuo Tarui, Seiichi Denda, and others of the Electrotechnical Laboratory succeeded in trial-fabrication of the first ICs in Japan on December 1960 (Press release: January 1961). This is a big achievement in the early stage of R & D life of Dr. Denda. The concept of an early IC was close to a subsequent hybrid IC rather than a monolithic IC. The hybrid IC is composed of active devices (diode and transistor) and passive components (resistor, capacitor, inductor, etc.); they are interconnected by thin film and/or thick film wirings on a substrate. When Dr. Denda met the concept of the hybrid IC, he realized its potential and importance. Then he strengthened his interest in electronics packaging technology as a means of fabricating electric/electronic systems and equipment with desired functions. It is particularly worth noting that from early he penetrated into the importance of the concept of the 3-D packaging technology, and he researched on TSV (through silicon via) and application of a glass substrate with TGV (through glass via). As a result, he published some reference books such as (1) the TSV technology for 3-D packaging (in 2009), (2) the high-dimension technology for semiconductor devices – 3D/2.5D/2.1D packaging using through vias (in 2015), and (3) 3-dimensional packaging technology for semiconductor devices (in 2011). He also organized the seminar concerning the glass substrate, there he himself made a lecture. Moreover, he has been convinced of arrival of the chiplet technology era.

Seiichi Denda was born on November 23, 1931 in Nagano, Japan. He received the B.E. degree from Shinshu University in 1954 and Dr. Eng. degree from Tohoku University in 1964. Professor Junichi Nishizawa, Tohoku University, extolled the Denda’s doctoral thesis. He joined the Electrotechnical Laboratory in 1954 and performed research and development on the semiconductor. He studied abroad in the California Institute of Technology as a Research Fellow from 1954 to 1955. In 1969 He moved to Sanken Electric Co., Ltd., and developed a high-power hybrid IC in 1979. From 1981 he conducted a business work related to semiconductor as a managing director. In 1983 he inducted as the president of Sanken Electric USA Inc. In 1985 he was invited to Konishiroku Shashin Kogyo Co., Ltd. (at present Konica Minolta, Inc.) as the director of

Mechanics-Electronics Center, and in the following year he was promoted to the executive director. He spearheaded the development of a new digital imaging technology by integrating two technologies for analog silver halide photography and electro photography, and exerted himself for the creation of new businesses. Afterwards, he held various posts; the chairman of the board of Konica Technology USA, and the permanent advisor.

As academic activities, he gave a lecture on the fundamentals of electronics packaging at Tokyo Polytechnic University (the Lecturer), Shinsyu University (the Visiting Professor, the Lecturer), and Nagano Prefectural Institute of Technology (NPIT, the Visiting Professor). At the NPIT, he organized the Education Promotion Committee and the Semiconductor/Electronics Packaging Technology Research Group, and made lectures 5 times per year from 1999 until 2007.

In 1967 some volunteers including Dr. Denda founded the ISHM Japan (International Society for Hybrid Microelectronics Japan). He actively involved with the ISHM Japan, and he played a major role to hold the IMC 1980 (International Microelectronics Conference) in Tokyo, which is the first international conference in the field of electronics packaging held in Japan. Dr. Denda acted as the General Chairperson. Dr. Denda occasionally said to the author (K. Hashimoto) that we made a decision to organize the conference with our desperate determination, that is to say, “we jumped off the veranda of the Kiyomizu temple” (this phrase is used when we make a bold decision in Japan). This conference continues to the present, but the name is renewed as the ICEP (International Conference on Electronics Packaging). Afterwards he acted energetically to develop, to spread, and to enlighten on the electronics packaging technology. Some typical examples are cited as follows; (1) the Chairperson of the IMAPS Symposium Japanese Session on October, 1987, (2) the General Chairperson of the 1st IEMT/IMC Symposium (at present ICEP) on April, 1997. (3) the IMAPS Asia President on April, 2004 (until April, 2006), (4) the person in charge of the Japan-Singapore Collaborative Symposium on Electronics Packaging on July, 1998, (5) the person in charge of the Japan-Korea Collaborative Symposium on Electronics Packaging on October, 1999 (until October, 2005).

Due to his contribution to develop the electronics packaging technology and to build a close relationship with IMAPS, Dr. Denda received some awards as follows; (1) ISHM Technical Achievement Award on May, 1994, (2) IMAPS Fellow Award on October, 1998, (3) JIEP Achievement Award on July, 2001, (4) IMAPS International Award on September, 2005, (5) IMAPS Korea Technical Achievement Award on April, 2007.

Dr. Denda successively held the positions of Vice-President of the Electronics Packaging Association from 1995 until 1997, President of JIEP/IMAPS Japan from 1998 until 2000. He is now the Honorary Advisor of JIEP since 2002, the Fellow of IMAPS since 2005, and the Life Member of IEEE.

In his later life, Dr. Denda founded some organizations concerning electronics packaging technology; NJF [Nagano Jisso Forum (“Jisso” means “electronics packaging” in Japanese)] and EPTA (Electronics Packaging Technology Association). Through some activities of these organizations, he made efforts to nourish, guide, and train younger person as well as professionals. He published 18 reference books in the field of electronics packaging and semiconductor, etc.

Dr. Denda’s professional life and accomplishments touched the lives of many engineers and researchers. Dr. Seiichi Denda will be missed dearly.

[Written by Kaoru Hashimoto (IMAPS Fellow) on December 16, 2023]

Footnote

The part of integrated circuits (IC) is referred to “Story of IC” by Yasuo Tarui (in 1982, NHK Publishing, Inc.) and “Half Century of Japanese Semiconductor” by Yukio Shimura (in 1999, Kogyo Chosakai Publishing Co., Ltd.).