1999

20. Hiroshi Inagaki

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Personalities in Polymer Science

Hiroshi Inagaki

Honoring Professor Hiroshi Inagaki on his 75. Birthday

Hiroshi Inagaki is a leading **polymer physico-chemist** and **fiber technologist** in Japan. His postdoctoral experience in Germany gave him a unique insight into **European science and culture** and inspired his interest in **international cooperation**.

Hiroshi Inagaki was born in Nagoya on December 3, 1924, as the first son of Koichi and Teru Inagaki. They had four other sons. His father was a businessman who was active in Osaka.

Hiroshi grew up in his mother's old home in Nagoya until he was 9 years old. He then moved to Osaka and went to Elementary School and then to the Imamiya Middle School which had also been attended by such famous scientists as Masao Horio [Polymer News, *22(6)*, 241(1997] and Ken-ichi Fukui [Polymer News, 22(11), 389(1997)].

Hiroshi's education as a scientist began in 1941 in the Himeji High School (a national elite High School of pre-war Japan). There he received his first training in advanced natural science and humanistics. During his studies there he listened to a young University Professor of Kyoto Imperial University, Ichiro Sakurada, who spoke about materials based on molecules with a huge molar mass. This first encounter with "polymers" led him to decide to enroll, after graduation in 1943, in the Department of Textile Chemistry at the Faculty of Engineering, Kyoto Imperial University in October of the same year.

In the later part of World War II university students in Japan were recruited to contribute to the war effort and, in February 1945, Inagaki moved to a chemical factory in Ootake, near Hiroshima City which is at present a plant of the Mitsubishi Rayon Co., Ltd. At that time, viscose rayon, poly(methyl methacrylate) and, on a pilot plant scale, poly(vinyl butyral) were produced. Because of this location, about 20 miles from Hiroshima, Hiroshi Inagaki witnessed the detonation of the first atom bomb over Hiroshima in August 1945. This event had a fundamental immediate and long lasting impact on his life.

In September 1946, Hiroshi Inagaki received his diploma of engineering from Kyoto Imperial University under the guidance of Professor M. Horio. He decided to continue his studies with Professor Horio on the *Dissolved State of Sodium Cellulose Xanthate* by measuring the translational diffusion coefficient. This subject was selected because it was closely related to the history of polymer science. In 1945, cellulose xanthate was known to be a polymer but it was not known whether this macromolecule existed in a true solution or in a micellar form. The experiment to decide between the two states tormented Inagaki because of the chemical instability of the sample. Finally he could determine the diffusion coefficients of the "solution" and found it to be in the order of 10^{-7} cm^2/sec which proved unequivocally that the macromolecule was *dissolved* in the aqueous media. Through the basic investigation into this fundamental problem, Inagaki's research interest was ignited and he started his work on the behavior of polyelectrolytes in solution.

In December 1948 Inagaki was appointed Lecturer (Ko-Shi) at the Faculty of Engineering, Kyoto Imperial University. In 1949, the University changed its name to Kyoto University. In July 1954 the Institute for Chemical Research, which belongs to Kyoto University as a graduate research institution, invited Inagaki to join them as Associate Professor (Jo-Kyoju).

During the end of 1950's, young scientists in Japan were encouraged to work at institutions abroad, especially in the USA. However, Inagaki chose to go to Europe, to the University of Mainz in Germany and spent over 2 years there, from August 1957 to December 1959. He chose Germany since academic life in Germany had a great tradition in chemistry. He worked with G.V. Schulz on the physico-chemistry of polymers in dilute solution. Hiroshi Inagaki was the first Japanese visiting scientist who worked at the Institute in Mainz and he became acquainted with a number of polymer scientists and engineers from Germany and other European countries. Curiously, his stay in Mainz was financially supported from funds from the US Marshall Plan.

Inagaki's close interaction with Germany has continued ever since. In 1963, he spent the summer semester at the University of Mainz and in 1968, the summer semester at the University of Freiburg. During the summer vacation, he visited the Macromolecular Institute of the Czechoslovak Academy of Sciences only to experience the turmoil of the Czech Spring and the take-over of Prague by Warsaw Pact troops.

After his return to Kyoto University in December 1959, Inagaki completed his work for his doctoral degree. At that time it was not a prerequisite to have a doctoral degree for obtaining an academic position at universities in Japan. In August 1960 he completed his dissertation entitled *Physico-Chemical Properties of Polyelectrolytes in Solution* (written in German) with Professor Horio as his advisor and received his degree of Doctor of Engineering. At the same time, Inagaki was appointed Full Professor (Kyoju) for the Laboratory of Polymer Properties at the Institute for Chemical Research, Kyoto University. He organized his chair (Koza) and appointed Tadao Kotaka as his instructor (Jo-shu).

In February 1984 Inagaki was elected Director of the Institute for Chemical Research, a position he held for two years.

In March 1988 Inagaki retired (at the mandatory age of 63) from Kyoto University and became Professor Emeritus. Somewhat different from the trend of a retired Professor of a Japanese University who often wants to continue teaching and research activities in private institution with a retirement age of 70, Inagaki started to work as scientific advisor for the chemical company BASF of Germany and still is active in his capacity.

Polymer News, 1999, Vol. 24, pp. 342 – 353

In 1988 Inagaki was approached by a private university, Mukogawa Women's University in Nishinomya City, Hyogo Prefecture and was invited to join the faculty of Human Life and Environmental Sciences as Professor and establish a post-graduate doctor course of home economics. He accepted and held this position from February 1989 to March 1996. From April 1991 to March 1996 he was Dean.

For forty years Hiroshi Inagaki was engaged in polymer research in the following subjects: a) Behavior of polymer electrolytes in solution; b) Molecular characterization of homopolymers and copolymers with different chain architecture; c) Separation techniques for polymers with the objectives of their applications; thin layer chromatography (TLC) and gel permeation chromatography (GPC); d) Chemistry of wool keratin and cellulosic materials aiming at the preparation of novel biomedical materials and e) Justification of radical copolymerization kinetics.

Inagaki's work is recorded in about 130 papers, 12 co-authored books and book chapters, 13 reviews and 8 patents in Japan and in the USA. He has served on the Editorial Board of Makromoleculare Chemie, British Polymer Journal and Polymer Journal (Japan).

Because of his extensive activities in Material Science and Macromolecular Physical Chemistry, Hiroshi Inagaki was elected Vice President of the Society of Fiber Science and Technology, Japan in March 1982 and became the President in April 1984 for two years.

Awards and honors came to Inagaki for his scientific and personal achievements. In 1986 he received the Award for Distinguished Service for the Advancement of Polymer Science of the Society of Polymer Science, Japan and in 1987 the Award for Outstanding Service to the Society of Fiber Science and Technology of Japan. He is an Honorary Member of the Association named "Vereinigung der Humboldtianer in Japan", which was established in 1993, to encourage the strong interactions of academicians of Germany and Japan.

Having experienced the wretched spectacle of the bombing of Hiroshima as a consequence of the total war, Inagaki found it essential to broaden the bond between peoples. He recognized the importance of face-to-face encounters among persons of different nations, cultures, religions and social strata and played a important role in various international academic and student exchange programs. For example, he is a co-founder of the international student house in Kyoto, "Haus der Begegnung Kyoto", which was established in April 1965 by cooperation of Swiss and Japanese citizens. He was also instrumental in the establishment of the U.S.-Japan Seminar in Polymer Physics.

Hiroshi Inagaki has a number of hobbies. He is an enthusiastic international traveler, especially to Europe. He is interested in the history and architecture of European Cities, how they developed and why they survived centuries of sometimes adversary situations. As might be imagined, he is also interested in other cultural events such as listening to classical music (especially vocal music and opera). He also likes physical exercise and swims almost every morning for half an hour. Inagaki is an animal lover and is interested in everything related to "cats".

In 1949 he married Kazuko Murata, who was born in Osaka. They have two children, a boy and a girl, each of whom has two children, so the Inagakis now have four grand children. Hiroshi Inagaki now enjoys his private life with his wife and two cats. He still travels at least once a year to Europe, to enjoy the life there and carry out some work. The Inagakis live in Nagaokakyo, a city, which is located west of Kyoto and was the capital of Japan for about ten years near the end of the ninth century.

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