

1996

48. Junji Furukawa

Otto Vogl

University of Massachusetts - Amherst, vogl@polysci.umass.edu

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Vogl, Otto, "48. Junji Furukawa" (1996). *Polymer News*. 225.
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Personalities in Polymer Science



Junji Furukawa

Junji Furukawa has been one of the great Japanese scientists of the **Kyoto tradition of polymer science**. He had a life long commitment to the **science and technology of elastomers and rubbers**. It is not surprising that he also made major contributions to the **stabilization of rubbers**; his semiquantitative work on the effect of rubber antioxidants is now a classic.

Junji Furukawa was born in Osaka, the second largest city of Japan, on December 18, 1912, the first year of Taisho of the Japanese calendar. He is the son of Gihei Furukawa and Kob, formerly Yamada.

His father died when young Junji was in his infancy and his mother raised him. His elder brother also provided a considerable amount of inspiration for Junji and was partly responsible for his interest in science. Junji went to both elementary school and the commercial high school in Osaka. After graduation in 1931, he entered the Himeji senior high school concentrating on their science curriculum. He graduated in 1934 and entered what was then the Kyoto Imperial University. Initially, he planned to become a medical doctor but he soon changed to industrial chemistry at the Engineering Faculty.

His graduate research at the University was carried out in the laboratory of Professor Kita under the direct guidance of Dr. Karl Lauer. Furukawa started to investigate physical chemistry of the

association of naphthalene. At that time **synthetic rubber** was a very important subject of research in Japan and he became interested in this subject.

After graduation from the University in 1937, Furukawa remained at Kyoto Imperial University continuing his research on synthetic rubber and invented a new method for the preparation of butadiene from acetylene through vinyl acetylene as an intermediate. Acetylene was at that time the basis of much of the hydrocarbon chemistry. In 1942, Furukawa was responsible for the construction of a pilot plant, operated in the Chemical Institute of Kyoto Imperial University which was transferred to Sumitomo Chemical Industry in Nihama. This production facility was based on a copolymer of butadiene and methyl vinylketone, a then new excellent oil-resistant rubber. For this invention, the Japanese Imperial Society of Invention selected Furukawa for their prize in 1943. He was granted the degree of Doctor of Engineering at Kyoto Imperial University in 1943.

In 1940, Junji Furukawa had been appointed an Associate Professor at the Chemical Institute of Kyoto University and, in 1948, he became Full Professor. In 1950, he accepted the appointment of Professor at the Faculty of Engineering of Kyoto University.

Furukawa's scientific accomplishments throughout his life were extensive. His work ranged from the general investigation of rubber and the properties of elastomers to stabilizers, from polymerization mechanisms to some aspects of the theory of rheology.

His early work was concerned with synthetic rubber based on butadiene and methyl vinylketone. His fascination with the polymerization of butadiene never ceased. He was involved with the development of *cis*-1,4-polybutadiene and alternating butadiene/propylene copolymers using modified Ziegler-Natta type catalysts to perfect the alternating tendency which was at that time, revolutionizing. His contributions to the alternating polymerization of butadiene and acrylonitrile are also significant.

Much of Furukawa's work in the 50's and 60's was dedicated to the synthesis of polymers from oxiranes and aldehydes with aluminum and zinc alkyls, modified with water and other reagents. Some of these initiating systems are often the only way of preparing quickly and simply high

molecular weight polymers of these monomers and are often referred to as "Furukawa catalysts".

In 1976, Junji Furukawa retired from the Department of Synthetic Chemistry of Kyoto University and accepted a position of Professor both at the Aichi Institute of Technology and at the Science University of Tokyo. At the same time he became a Corporate Advisor of the Japan Synthetic Rubber Company (JSR). He retired from the two institutions in 1986 and from the JSR position in 1992.

Junji Furukawa was a prolific writer based on his extensive research. He published about 700 papers, 45 chapters and reviews and was the author, co-author and editor of 26 books.

In addition to all his scientific and administrative responsibilities, Furukawa played a very significant role in national and international scientific activities. He was elected a member of the Science Council of Japan and served from 1970 to 1976. This Council advises the Emperor and the Japanese Government on matters of the Arts and Science. Furukawa also served as the president and Council Member of a number of very prestigious Japanese societies. He was the President of the Chemical Society of Japan in 1978, the President of the Society of Polymer Science, Japan in 1976-1977 and the President of the Society of Rubber Industry, Japan in 1985-1986.

Furukawa also received several International honors. He was a Member of the Academy of Science of the former German Democratic Republic and of Yugoslavia (1978-92). He was a main and plenary lecturer of many International meetings and Congresses and served as a visiting professor at a number of Universities.

The Japanese Government decorated Furukawa twice in 1976 and in 1984 in recognition of his contributions to academia and education in Japan. Junji Furukawa received several Awards, Prizes and Medals of Japanese and foreign societies: The Award of the Chemical Society of Japan in 1956, the Oenslager Award of the Chemical Society of Japan in 1963, the Award of the International Institute of Synthetic Rubber Producers in 1974, the Colwyn Medal of the British Rubber and Plastic Institute in 1977, the Witco Award of the Polymer Chemistry Division of the American Chemical Society in 1978 and the Japanese Fujiwara Award in 1978.

Columns

Junji Furukawa has served on the editorial board of a number of Japanese and international scientific journals. Even now, he is serving on the editorial board of "Bulletin of Chemical Society, Japan", "Journal of Applied Polymer Science" and "Die Angewandte Makromolekulare Chemie".

Furukawa has been involved in the organization and creation of international symposia in Japan and abroad, such as the Japan-U.S.A. Seminar on Polymer Synthesis first held in 1974 in Fuji-Hakone and the International Rubber Congress in 1975.

In 1943, Junji Furukawa married Nobu Kita. They have three daughters, Miyo, Yumi and Chic, and seven grandchildren. Two of three sons-in-law are professors of chemistry and the other is a medical doctor.

Junji Furukawa's main motto is "Never too old to learn". He is interested in Japanese paintings and is also an enthusiastic photographer. Junji Furukawa now lives in the suburbs of Kawasaki, a large City near Tokyo with his wife Nobu and he enjoys, whenever possible, his grandchildren.

This article has been submitted by Otto Vogl, Herman F. Mark Professor of Polymer Science, Polytechnic University, Brooklyn NY.