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## 6. Ichitaro Uematsu

Item Type	article;article
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Download date	2026-06-17 15:58:09
Link to Item	<a href="https://hdl.handle.net/20.500.14394/23077">https://hdl.handle.net/20.500.14394/23077</a>

## Personalities in Polymer Science



Ichitaro Uematsu

### Honoring Professor Ichitaro Uematsu on his 77<sup>th</sup> Birthday (Kijyu)\*

Professor Ichitaro Uematsu has played an significant role in the modernization of Polymer Science in Japan. He has shown an early interest in biological polymer systems, he was active in the restructuring of polymer science at the Tokyo Institute of Technology and he held a number of important positions in the Society of Polymer Science, Japan.

Ichitaro Uematsu was born on February 23, 1923 in Hiratsuka City, Kanagawa Prefecture, near Tokyo, as the oldest son of Masaku Uematsu and Kiyoko Uematsu and grew up in Yokohama. He went to Elementary School in Yokohama, to Middle (Junior High) School in Numazu and to the Yokohama Technical High School from where he graduated in 1942.

In 1942 he enrolled at the Tokyo Institute of Technology (TIT) and was intrigued by the late Kiso Kanamari, a leading Professor of polymer science in Japan in the 40's and 50's. In those days there were few books on polymer science in the world and Kanamari's text book became very famous in Japan.

In 1945, Ichitaro Uematsu received his Bachelor Degree of Engineering from TIT and was appointed Lecturer (Jo-shu) at the

Department of Applied Chemistry, Faculty of Engineering at TIT. He started to investigate physics of metals and glasses but soon decided to study the relationship between structure and properties of polymeric solids.

He started his research activities under difficult circumstances. After World War II, shortages were everywhere and the electric power shortages and unexpected black-outs quite often interrupted experiments. The research facilities were still poor and research funds were insufficient to obtain research instruments. As a matter of convenience Uematsu selected the use of dilatometric methods to study the phase transition phenomena of various materials. He constructed his own glass dilatometer and measured the volume change at varying but constant temperatures on quenching the melt of Nylon-6. The isothermal crystallization curves obtained were analyzed by the Avrami's theory. This is now a routine procedure, but Uematsu's work at that time was among the first.

He continued to carry out his studies of glass transitions, melting and crystallization behavior of polymers. His research interests included: crystallization kinetics, effect of crystallinity on Tg and viscoelastic properties and Tg's of copolymers and polymer blends. In 1961, he received his degree of Doctor of Engineering at TIT under the guidance of Professor Kiso Kanamari with a thesis entitled "Studies of Thermal Properties of Polymer Solids".

In 1962 Ichitaro Uematsu went to the U.S. and worked with Professor W. Krigbaum at Duke University. His postdoctoral experience at Duke University brought him in contact with the scientific activities in the Research Triangle in North Carolina. He also noticed that bio-related science had started to flourish in U.S. and his recognition became a turning point to his later research on synthetic polypeptides.

In 1965 Uematsu returned from the U.S. and was promoted to Associate Professor (Jo-kyoju) at the Department of Polymer Chemistry, Faculty of Engineering at TIT. As was customary at that time at TIT he could already have his own laboratory. Together with Noboru Yamazaki [Polymer News, 23(12), 416-417 (1998)] he persuaded senior professors at TIT that a separate Department of Polymer Science was needed. In those days his research interest gradually shifted from structure and properties of flexible polymers to rigid rod-like polymers. In 1970 he started his studies on synthetic polypeptides.

After 1970, he began investigating synthetic polypeptides. This work led to his most important contributions to polymer science:

- (1) Solid-state modifications of polypeptides. Several modifications of the arrangement of  $\alpha$ -helical structures were found in solid films of polypeptides
- (2) Racemic mixtures of  $\alpha$ -helical polypeptides having phenyl groups at the end of the side chains. Racemic mixtures of poly( $\gamma$ -benzyl glutamate) were found to exhibit a thermally reversible first-order transition at about 90°C.
- (3) Lyotropic liquid crystals of polypeptides. Thermally induced inversion of the cholesteric sense was found in lyotropic polypeptide liquid crystals. The cholesteric sense of poly( $\gamma$ -benzyl L-glutamate) liquid crystals in *m*-cresol inverts from right to left handed with increasing temperature.
- (4) Thermotropic liquid crystals of polypeptides

A series of poly( $\gamma$ - $\alpha$ -methyl D-glutamate-co- $\gamma$ -hexyl D-glutamate)s were prepared with varying hexyl content. Copolymers with intermediate hexyl contents from 30-70% led to the formation of thermotropic liquid crystals reflecting visible light in the temperature range above 150°C.

In 1983 Ichitaro Uematsu reached the mandatory retirement age at TIT. He was subsequently offered and accepted the position of Professor at Tokyo Kasei University. This university is one very famous women's college with a long history but with not much research activity. The university recruited him to establish a Graduate School. During the period from 1987 to 1991 he served as Dean of the Faculty of Domestic Science and also succeeded in establishing the Graduate School. In 1989 he became Dean of the Graduate School of Domestic Science and in 1993 he again retired.

In addition to his academic work, Ichitaro Uematsu devoted much of his time and efforts to the Society of Polymer Science, Japan (SPSJ). He was a Director of Kanto (Tokyo) Branch of SPSJ from 1968 to 1974 and from 1974 to 1976 he was the chairman of the Kanto Branch. From 1974 to 1982, he was a Director of SPSJ, Vice President from 1976 to 1978 and President from 1982 to 1984. Since 1984 he is functioning as Councilor.

Uematsu was Editor-in-Chief of the Polymer Journal (Japan) from 1978 to 1982 and a Advisory Board Member from 1982 to 1986. He was an Advisory Member of Polymer Bulletin from 1978 to 1986 and the Journal of Polymer Materials from 1981 to 1983.

For his accomplishments in polymer science and his service to professional societies, he received a number of awards. The Award for Distinguished Service for the Advancement of Polymer Science from SPSJ

\*For the significance of special Japanese Birthdays, see O. Vogl and T. Ouchi, Polymer News 21(1), 18 (1996)

## Columns

in 1987 and the Distinguished Science Award from the Material Society of Japan in 1989. In 1989 he was elected an Honorary Member of SPSJ.

Uematsu also played major roles in international professional relations. He co-chaired with J. Economy (IBM) the Chemical Congress in Hawaii, in 1979. In 1980, he was a member of Organizing Committee and the Vice Chairman of the Scientific Committee of the 8th International Liquid Crystal Conference in Kyoto. In 1981, he was involved in the organization of the 1st Japan-China Polymer Symposium in Tokyo and was the Vice Chairman of the 2nd Symposium in Beijing in 1984. In 1984, he was the first Chairman of International Polymer Conference SPSJ, which was founded while he was president of SPSJ.

Playing golf had become one of Ichiharo Uematsu's personal and primary hobbies ever since he spent some time in the US. He has never declined an invitation and always likes to be invited to play golf. Another hobby common to Ichiharo and his wife Yoshiko is bird-watching. Yoshiko and Ichiharo enjoy doing crossword and jigsaw puzzles; Yoshiko has become an expert in assembling jigsaw puzzles of 3000 or even 5000 pieces, forgetting to eat and sometimes even to sleep. Both also play mah-jongg, a chess like board game played in the orient with their friends and sometimes even on a screen of their personal computer equipped with the software for the game.

In 1957 Ichiharo Uematsu married Yoshiko Saito of Tokyo. They have two sons: Hiroki who is a Musician and Masaki who is a Medical Doctor.

Yoshiko Uematsu is a well known scientist of her own: Born in Tokyo, she grew up in Tokyo, went to Elementary School and Junior High School in Tokyo. For her High School, she went to Kumagaya (Saitama Prefecture).

Yoshiko Uematsu started her academic life at the Department of Chemistry of the Faculty of Science, Ocha-no-mizu Women's University in 1950. She received her Bachelor Degree in Science from there in 1954. Yoshiko was admitted into the graduate school of Tokyo Institute of Technology in 1955 and, during the period from 1955 to 1960, she studied for her doctoral degree under the direction of Ichiharo Uematsu in Professor Kanamara's laboratory. In 1960 she received her Doctoral Degree of Engineering at TIT with a thesis entitled "Effect of Crystallinity on Physical Properties of High Polymers" under the guidance of Professor Taro Tachibana.

In the 50's and 60's, it was difficult for woman scientists in Japan, especially those with children, to balance a personal life as a

wife and as a mother with a professional life. Yoshiko's success in her academic career was based on her enthusiasm for research and her drive to succeed.

From 1960 to 1966 Yoshiko Uematsu worked in the Kobayashi Physical Research Institute and studied viscoelastic properties of high polymers. From 1962 to 1964 she went with her husband to Duke University where she worked in Professor D. Fluke's laboratory in the Department of Zoology and studied the effect of irradiation on enzyme activities. After returning to Japan, she joined the Tokyo Institute of Polytechnics (TIP) which had been newly established in Atsugi, Kanagawa Prefecture, and became an Associate Professor (*Jo-kyoju*) in the Faculty of Engineering in 1966. During the construction of the new laboratories from 1966 to 1968, she worked at the Research Institute of the Japan Leather Company.

After returning to the new laboratories, in 1971, Yoshiko Uematsu became a Professor (*Kyoju*) at TIP and started her own independent studies on polypeptide liquid crystals. She carried out pioneering work on the effect of electric and magnetic fields and surface anchoring of polypeptide liquid crystals and published about 60 papers of her own as well as 6 books and book chapters.

Yoshiko Uematsu was also active in professional and community service. She is the only woman to hold the position of Director of the SPSJ. Yoshiko Uematsu is charming and socially active. For several years she was also active in the regional community as a member of the Board of Education at Atsugi City.

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