Retirement

Professor NAKAHARA, Masaru
Division of Environmental Chemistry
—Solution and Interface Chemistry—

On 31 March, 2009, Dr. Masaru Nakahara retired from Kyoto University after 36 years of service was honored with the title of Professor Emeritus of Kyoto University. Dr. Nakahara was born in Ohshima Island, Yamaguchi Prefecture on 9 June, 1945. He graduated from Department of Chemistry, Faculty of Science, Kyoto University in 1968 and studied high-pressure physical chemistry in the Graduate School of Science under the supervision of late Professor Jiro Osugi. In 1974, he was granted the doctoral degree for the thesis entitled "Effects of pressure on the mobilities and hydration of Bu_4N^+, Me_4N^+, K^+, Cl^- ions". In 1973, he was appointed Research Associate in Department of Chemistry, Faculty of Science, Kyoto University, and in 1986 he was promoted to Associate Professor. In 1994, he was appointed Professor in the Institute for Chemical Research, Kyoto University and directed the Laboratory of Solution and Interface.

Through his academic career, Dr. Nakahara devoted himself to physical chemistry of solutions and interfaces, focusing on structure, dynamics, and reaction of water and aqueous solutions over a wide range of thermodynamic conditions. He first studied the ionic conductivity in solution. He clarified the validity and limitations of the dielectric friction theory and deepened the concept of Walden product. He then turned to NMR studies of solutions, notably in dilution conditions. He successfully examined the "solitary water" in organic solvents; it is an isolated water molecule without hydrogen bonding and the behavior of water in hydrophobic media was first revealed.

At the Institute for Chemical Research, he extended his study to high-temperature and/or high-pressure, extreme conditions. As a world pioneer, he first developed a high-temperature NMR probe and made possible the chemical-shift measurement at 400 °C. He revealed the persistence of hydrogen bonding in supercritical water and determined quantitatively the degree of hydrogen bonding in hot water. The dynamic picture of supercritical water was also established, and the molecular mechanism of the translational and rotational relaxations was finely clarified with the notion of solvation-shell lifetime.

With deep knowledge of hydration in hot water, he systematically investigated environmentally friendly reactions in supercritical water. He discovered several, non-catalytic C1 reactions, and clarified the general reaction pathways of aldehyde in hot water. The role of formic acid as an intermediate of the water-gas-shift reaction was pointed out, and this finding has led to a new scheme of hydrogen technology. The finding met the foundation of the new laboratory of Water Chemistry Energy in the Institute financially supported by AGC.

Dr. Nakahara's scientific achievements were published in 176 original papers. He was frequently invited to prestigious international conferences such as Gordon Conference (1988 and 1998), EuroConference (2001), and The International Conference on the Properties of Water and Steam (2004). To his achievements, the Award of The Japan Society of High-Pressure Science and Technology was given in 2004.

Dr. Nakahara's contribution to scientific communities is also to be noted. He has served as President of The Japan Society of High-Pressure Science and Technology (2001) and as President of The Japan Association of Solution Chemistry (2004 to the present), and was involved in organizing international conferences such as The 26th International Conference on Solution Chemistry (1999), The 14th International Conference on the Properties of Water and Steam (2004), and The 1st International Conference of the Grand Challenge to Next-Generation Integrated Nanoscience (2008). He was active in a number of committees of governmental sectors including MEXT, METI, and JSPS.

Dr. Nakahara's contribution to Kyoto University and the Institute though his scientific, educational, and administrative activities is hereby greatly acknowledged.