# PERSONAL

# Retirement

Professor TOKITOH, Norihiro
Division of Synthetic Chemistry
– Organoelement Chemistry –

On March 31st 2022, Dr. Norihiro Tokitoh retired from Kyoto University after 22 years of service and was honored with the title of Professor Emeritus of Kyoto University.

Dr. Tokitoh was born in Miyazaki Prefecture on January 26, 1957. He graduated from Faculty of Science, the University of Tokyo in 1979, and entered the graduate school. He received the doctoral degree under the guidance of Professor Naoki Inamoto in 1985. He was appointed to a research associate at International Christian University in 1985 and to an assistant professor at Tsukuba University in 1986. In 1989, he was appointed to an assistant professor at the University of Tokyo, and promoted as an associate professor in 1994. In 1998, he moved to Kyushu University as a professor at Institute for Fundamental Research of Organic Chemistry. In 2000, he was employed as a professor at ICR, Kyoto University and has been working until 2022. During this time, he served as a guest professor at Institute for Molecular Science (2001–2003) and as a visiting professor at Technische Universität Braunschweig (2004–2007) and at Universität Bonn (2012–2014) in Germany.

Throughout his academic career, Dr. Tokitoh's research has been focused on "main group element chemistry", especially on novel bonding and structures of highly reactive species including "heavy elements", that is, main group elements in the periods 3rd through 6th. He is one of the pioneers in the chemistry of multiply bonded and low-coordinated compounds containing heavy main group elements and has created a number of novel compounds with many unique structures and properties by taking advantage of a kinetic stabilization method utilizing original steric protection groups developed by himself. It is noteworthy that he has made significant impacts on the research field by synthesizing and isolating novel compounds including elements of various groups and periods without limiting the elements to be studied. He systematically studied their structures and properties and verified the differences and similarities in the properties of elements. Furthermore, based on his pioneering research achievements, he has expanded his research into the construction of extended π-electron systems, transition metal complexes, and small molecule activation, opening new areas including new reactions. These achievements have been published as 468 original papers and 25 reviews in academic journals and 24 books (edited and co-authored).

His educational contribution to Kyoto University is also noteworthy. He has supervised 71 graduate students (45 Ph. D. degrees and 49 Master degrees) as a professor at Department of Chemistry, Graduate School of Science, and sent them out to academia and industry.

He has served on the boards and committees of many chemistry-related academic societies, including as President of the Society of Silicon Chemistry, Japan (2016–2018) and President of the Society of Physical Organic Chemistry, Japan (2018–2022). He has also served as an editorial board member and editor-in-chief of many domestic and international journals, including the Bulletin of the Chemical Society of Japan (2013–2016), and as a member of the international advisory board of various international conferences representing Japan, greatly contributing to the development of the field of chemistry. He has also organized two international conferences held at ICR (the 10th International Conference on Heteroatom Chemistry in 2012 and the 15th International Symposium on Inorganic Ring Systems in 2018, the latter of which was first held in Japan), and is highly trusted by researchers in Japan and abroad. In addition, he has given an extremely large number (73) of plenary, keynote, and invited lectures at a variety of international conferences, reflecting the results of his continuous world-leading research.

His contribution to the administration of Kyoto University and ICR is also very significant. At ICR, he served as Deputy Director (2005–2008) and as Director (2008–2012 and 2014–2018; totally 7 and half years). In addition, he served as Director, Kyoto Univ. Pioneering Research Unit for Next Generation (2006–2008), Dean, Kyoto University, Division of Natural Sciences (2016–2018), Director, Kyoto University, Section of Integrated Chemistry (2016–2018), Vice-Director, Kyoto University, Institute for Liberal Arts and Sciences (2017–2020), and Director, Kyoto University, Research Coordination Alliance (2018–2020). Since 2020, he is serving as Executive Vice-President of Kyoto University for Research, Evaluation, and Industry-Government-Academia Collaboration.

For his achievements, he was awarded Special Lectureship Award for Young Generation from the Chemical Society of Japan in 1991, Incentive Award from the Society of Synthetic Organic Chemistry, Japan in 1992, Incentive Award from the Society of Silicon Chemistry, Japan in 1992, Japan IBM Science Award in 1998, Chemical Society of Japan Award for Creative Work in 2003, Alexander von Humboldt Research Award in 2003/Re-invitation in 2013, Lectureship Award of National Science Council, Taiwan in 2007, the 3rd Kim Yong Hae Lectureship Award KAIST, Korea in 2010, Best Reviewer Commendation from Japan Society for the Promotion of Science in 2010 and 2017, JSBBA Award from the Japan Society for Bioscience, Biotechnology, and Agrochemistry in 2017, and Society Award from the Society of Silicon Chemistry, Japan in 2019. In addition, it is noteworthy that he received BCSJ Award from the Chemical Society of Japan seven times (2002, 2005, 2007, 2009, 2010, 2013 and 2016), making him the most frequent recipient of this award.

Dr. Tokitoh's contribution to Kyoto University and ICR through his scientific research and education is highly appreciated. His sincere attitude toward science will remain in the memory of the people knowing him for a long time in the future.

# Retirement

Professor WATANABE, Hiroshi
Division of Multidisciplinary Chemistry
– Molecular Rheology –

On March 31, 2022, Dr. Hiroshi Watanabe retired from Kyoto University and was honored with the title of Professor Emeritus. He was born in Kagawa Prefecture on January 30, 1957. In 1979, he graduated from Faculty of Science, Osaka University, and entered the graduate school with a guidance of Prof. Tadao Kotaka. He quitted the graduate school in 1983 to start working as Research Associate in Prof. Kotaka's lab, received a doctoral degree from Osaka University in 1985, and was promoted to Assistant Professor in 1987. In 1987–1989, he made a research stay at Department of Chemical Engineering and Materials Science, University of Minnesota, as Post-Doc working with Prof. Matthew Tirrell (while keeping the Assistant Professor position in Osaka University). He moved to Prof. Kunihiro Osaki's lab at the Institute for Chemical Research (ICR), Kyoto University, as Associate Professor in 1994, and was promoted to Professor in 2003.

Dr. Watanabe has been investigating dynamics and rheology of various softmatters. He combined several experimental methods, for example, rheological, dielectric, and small angle x-ray and neutron scattering (SAXS and SANS) methods, with theoretical model analyses to reveal physical factors governing the dynamic behavior of softmatters, as explained below for some examples.

AB-type diblock copolymers with relatively short B blocks form spherical micelles in A-selective solvents, with the unsolvated B blocks forming micellar cores and the solvated A blocks serving as corona chains. He combined rheological and SAXS methods to find that those systems exhibit plasticity because of a regular lattice of the micelles stabilized by an osmotic interaction between the corona chains. From rheo-SANS experiments, he revealed that the plastic flow occurs at boundaries between grains of the micellar lattice without disruption of the lattice itself and that the force sustained by the lattice is consistent with a magnitude of the osmotic interaction. He also demonstrated that the micelles are randomly dispersed to lose their plasticity in A-homopolymers (polymeric solvents) that screen the osmotic interaction, thereby confirming the origin of the plasticity explained above.

Those micellar dispersions exhibit polymeric characters in short time scales but behave similarly to suspensions of Brownian particles in long time scales. For investigation of this similarity, he conducted rheo-SANS experiments for suspensions of nano-silica particles. He found that the viscosity $\eta$ of the suspensions first decreases and then increases on an increase of the flow rate, with the decrease of $\eta$ reflecting just a weak decrease of the placement entropy of the particles under slow flow whereas the increase of $\eta$ resulting from jamming of the particles under flow faster than their Brownian motion. He revealed that the diblock micellar dispersions exhibit the decrease of $\eta$ with the same mechanism related to the placement entropy of the micelles but no increase of $\eta$ because the micellar corona chains behave as polymer brushes and prevent the micellar cores from the jamming.

He also found that the short time behavior of the micellar dispersions is governed by the entanglement among the corona chains, as characteristic to polymers. This finding led him to study a detailed molecular aspect of entanglement for model systems, blends of chemically identical long and short homopolymers. His experiments identified, for the first time in the world, full viscoelastic relaxation of dilute long chains activated by the short chain motion, known as constraint release (CR) relaxation. Furthermore, for polymers having electrical dipoles parallel along the chain backbone, he realized that the viscoelastic and dielectric relaxation functions reflect the same chain dynamics but with different averaging moments, and formulated a theoretical relationship between those functions. He tested this relationship for viscoelastic and dielectric data of various blends to establish that a coarse-grained view of CR, known as dynamic tube dilation, is valid if a spatial scale of the CR-activated motion of the chain is properly incorporated in that view. He also realized the importance of the dynamics of short unentangled chains in the nonlinear behavior of long entangled chains under fast flow, and analyzed the unentangled chain dynamics by considering flow effects on the local friction and elasticity as well as on the Brownian force.

His achievements have been highly appreciated in the worldwide community of softmatter science, as evidenced from awards for him that include the Fellow of the American Physical Society (2005), the Research Award of the Society of Polymer Science, Japan (2008), the Research Award of the Society of Rheology, Japan (2012), and the Bingham Award of the Society of Rheology, USA (2015). Furthermore, he served to the community through various roles, for example, the President of the Society of Rheology, Japan (2015–2017), the President of the International Committee on Rheology (2016–2020), and the Associate Editor of *Macromolecules* issued by the American Chemical Society (2011-present).

In summary, Dr. Watanabe has contributed to ICR and Kyoto University through his scientific research and education as well as his role of Vice-Director of ICR (2008–2012). His open-minded scientific approach, based on the principle of rheology cast in the famous phrase "πάντα ῥεῖ (*everything flows, and changes with time*)", will surely encourage further studies of softmatters.