PERSONAL

Retirement

Professor AOYAMA, Takashi
Division of Biochemistry
– Molecular Biology –

On March 31st, 2024, Dr. Takashi Aoyama retired from Kyoto University after 39 years of service and was honored with the title of Professor Emeritus of Kyoto University.

Dr. Aoyama was born in Osaka Prefecture on November 7th, 1958. He graduated from the Faculty of Science, Kyoto University, majoring in Biological Sciences in 1981. He then proceeded to Graduate School of Science, Kyoto University, where he studied molecular mechanisms of gene expression regulation under the supervision of late Professor Mitsuru Takanami. In 1985, he left Graduate School to be appointed as Research Associate at Institute for Chemical Research, Kyoto University. In 1988, he was appointed Assistant Professor of Institute for Chemical Research, Kyoto University, and promoted to Associate Professor in 1994, and to Professor in 2009, directing the Laboratory of Molecular Biology. In 1987, he was granted a doctoral degree with the thesis entitled "Essential structure of E. coli promoter". On leave from the University during 1991 to 1993, he joined the Laboratory of Plant Molecular Biology, directed by Professor Nam-Hai Chua at The Rockefeller University.

Dr. Aoyama devoted himself in understanding the molecular function regulating gene transcription. His research started from studying the basic structure sequence elements determining the promoter function in *Escherichia coli*. Then he elucidated the gene expression control mechanism for T-DNA transfer and its integration into a plant nuclear genome from *Agrobacterium rhizogenes* and *A. tumefaciens* species. During his stay at The Rockefeller University, he development a novel chemical induction system for transcription in plants, utilizing the regulatory mechanism of vertebrate steroid hormone receptors. He developed a chimeric transcription factor that combined the receptor domain of the mammalian glucocorticoid receptor GR, the transcription activation domain of the herpesvirus transcription factor VP16, and the DNA binding domain of the *Saccharomyces cerevisiae* transcription factor GAL4. By expressing this chimeric transcription factor GVG in transformed plants, he established a chemical transcription induction system that effectively works in individual plants, for the first time. Today, this novel system is openly used in basic research and is applied in the commercial research field through licensed patents.

His investigation of the transcriptional control network in plant cell morphogenesis, and the following elucidation of the regulation in plant lipid signaling, were all founded on his unique style of research utilizing reverse genetic methods and plant transformants. He took advantage of the chemically induced reverse genetic methods to investigate the downstream of the transcription factor GL2, which plays a central role in the formation of single-celled trichomes and root hairs. He designed an extensive gene search strategy using the model plant *Arabidopsis thaliana*, and identified genes encoding the lipid metabolic enzyme PLDζ1 and genes encoding bHLH-type transcription factors as direct target genes. Achievements on PLDζ1 were published in the Science journal in 2003 and was featured on the cover page, as important evidence showing the involvement of lipid signaling in plant cell morphogenesis.

He then expanded his research interests to the role of lipid signals in plant cell morphogenesis, and analyzed the biological functions of PLD and PIP5K. Studies using root hair cells and pollen, as a model for single cell morphogenesis, revealed that PIP5K and its product PI(4,5)P_2 play a central role together with small G proteins in establishing and maintaining intracellular polarity. In addition to this, the research of analyzing the loss of function mutants of the nine major PIP5K genes of Arabidopsis and their multiple mutants have been internationally recognized as diligent, outstanding, field-leading work, to the complete the serial elucidation of the role of PI(4,5)P_2 signals in plants.

He has been invited to give keynote lectures at numerous international conferences. His achievements have been published in 70 original academic papers in international journals, 15 reviews and commentaries, and 11 co-authored books. He has also contributed to the field of plant science, serving as the secretary-general of the Japanese Society of Plant Physiologists and on the editorial board of the international journal, Plant Cell and Physiology.

Throughout his career, he enlightened many followers not only at Kyoto University but also at other universities and institutes with his thoughtful character. His contribution to Kyoto University and the Institute for Chemical Research through his scientific, educational, and administrative activities is hereby greatly acknowledged.

Retirement

Professor KANEMITSU, Yoshihiko
International Research Center of Elements Science
– Nanophotonics –

On March 31st 2024, Professor Yoshihiko Kanemitsu retired from Kyoto University and was honored with the title of Professor Emeritus of Kyoto University. Dr. Kanemitsu joined the Institute for Chemical Research in 2004 as a professor of physics. He set up a new laboratory for semiconductor physics and optical materials science as part of the International Research Center of Elements Science.

Throughout his academic career, Professor Kanemitsu has explored unique optical and electronic properties of semiconductors by applying various laser spectroscopic techniques. Semiconductor bulk crystals and nanomaterials are widely used in solar cells, light-emitting diodes, lasers, and other optoelectronic devices. His fundamental work has contributed to our basic understanding of semiconductor photophysics, helped improve the performance of optoelectronic devices, and led to the development of new concepts in optoelectronics. His outstanding achievements center on the exciton physics of semiconductor nanomaterials and the photophysics of perovskite-type semiconductors.

Professor Kanemitsu developed space- and time-resolved laser spectroscopy apparatus and methods for the study of optical properties of semiconductor quantum structures, including single-dot spectroscopy, photon correlation spectroscopy, and femtosecond transient absorption spectroscopy. He studied the luminescence spectra of isolated carbon nanotubes and single nanocrystals at low temperatures and elucidated their complicated excited state structures. He also clarified the important role of excitons, trions, and biexcitons in governing the luminescence spectra of carbon nanotubes and nanocrystals. In addition, he discovered the coherent state of multiple excitons in nanocrystals, as well as high-order harmonic light emission from nanocrystals. These findings highlight the importance of precise control of the exciton dynamics and exciton complexes for improving the performance of nanomaterial-based photonic devices. He also presented new device concepts based on nanomaterials with high-efficiency nonlinear optical response.

Professor Kanemitsu has also contributed extensively to the area of metal-halide perovskite semiconductors. After showing that halide perovskites are direct-gap semiconductors, he confirmed that the efficient luminescence is due to free carrier band-to-band recombination. He also discovered the phenomena of efficient photon recycling in thick perovskite single crystals. These seminal studies explained the reasons why halide perovskites are such excellent materials for solar cells. Along the way, he explored unique nonlinear optical phenomena such as high-order harmonic light emission, the Autler-Townes effect, and negative thermo-optic coefficients in these materials. His pioneering works in this area opened a new avenue of semiconductor optics and optoelectronic applications.

As a leading scientist in his field, Professor Kanemitsu has many other accomplishments. He served as the chairman of the 125 Committee on Mutual Conversion between Light and Electricity, The Japan Society of the Promotion of Science, and as an R&D management committee member of the ALCA and MIRAI programs, Japan Science and Technology Agency. He is also a member of several advisory committees of international conferences for optical spectroscopy of condensed matter. He established the Endowed Research Section at the Institute for Chemical Research supported by the Sumitomo Electric Group CGR Foundation.

Throughout his career, Professor Kanemitsu has published over 400 papers and presented many invited talks at international conferences and meetings. His achievements have been internationally recognized, and he has received many awards and prizes including the Marubun Research Encouragement Award (1998), Phosphor Award (2004), The Ichimura Prize in Science for Distinguished Achievement (2005), The Inoue Prize for Science (2006), The Yazaki Science Award (2006), The Eto-Hosoya Prize (2018), The Shimadzu Prize (2019), The Kato Memorial Award (2019), The Ichimura Prize for Science against Global Warming for Distinguished Achievement (2021), American Physical Society Outstanding Referee (2022), and The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (2022). In 2023 he was made a fellow of the Japanese Society for Applied Physics.

His contribution to Kyoto University through his scientific, educational, and administrative activities is acknowledged. His warm and sincere personality will remain deep in the hearts of his colleagues and students.