



**P**ERSONAL

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## Retirement

Professor KURATA, Hiroki  
Advanced Research Center for Beam Science  
– Electron Microscopy and Crystal Chemistry –



On March 31, 2023, Dr. Hiroki Kurata retired from Kyoto University and was honored with the title of Professor Emeritus of Kyoto University.

He was born in Ehime Prefecture on February 9, 1958. In 1980, he graduated from Faculty of Engineering, Nagoya Institute of Technology. He entered the Graduate School of Science, Kyoto University in 1981. He was appointed to Research Associate at the Institute for Chemical Research (ICR), Kyoto University in 1986, and was promoted to Assistant Professor in 1987. He received the doctoral degree from Kyoto University under the supervision of Professor Natsu Uyeda in 1988. In 1991-1992, he made a research stay at Laboratoire de Physique des Solides, Centre National de la Recherche Scientifique, as a visiting researcher. He moved to Japan Atomic Energy Research Institute in 1996, and promoted to Senior Researcher in 1997, and to Principal Researcher in 2000. In 2002, he moved to Professor Seiji Isoda's lab at ICR, Kyoto University, as Associate Professor, and was promoted to Professor in 2012.

Throughout his academic career, Dr. Kurata devoted himself to crystal chemistry, focusing on research on local structural analysis and electronic state analysis of solids using many types of transmission electron microscopes. Using a high-voltage transmission electron microscope, he succeeded in two-dimensional visualization of elemental distribution with sub-nanometer spatial resolution, and experimentally clarified the relativistic effect on the inelastic scattering cross section of fast electrons.

He also developed a cold-field emission electron gun equipped with a tungsten nano-tip. This newly developed electron gun was installed in a spherical aberration corrected scanning transmission electron microscope, enabling atomic resolution structural observation and electronic state analysis. Using this microscope, he has worked on the visualization of light elements in crystals, which was difficult in the past, and succeeded in visualizing carbon atomic columns in organic molecular crystals for the first time in the world. Furthermore, by directly observing the oxygen atoms at the heterointerfaces of transition metal oxides, he has contributed to the development of a precise structure analysis method for interfaces with an accuracy of several

picometers, opening up a new way for local structural analysis. Using the energy-loss near-edge structures obtained by electron energy-loss spectroscopy, he also investigated the directionality of chemical bonds of specific atoms, which are directly observed at the atomic resolution level, and clarified the local electronic structures related to structure distortions around specific atoms.

He extended his study to high energy resolution electron energy-loss spectroscopy by installing an atomic resolution analytical electron microscope equipped with a monochromator in the electron gun. He realized the visualization of the near-field electromagnetic field associated with the surface plasmon excitations in metal nanoparticles, and the two-dimensional real-space distribution of holes, which is key to manifesting the physical properties of high-temperature superconductors.

Throughout his career, his scientific achievements have been published as 188 original papers, 27 reviews and 5 books. His achievements were highly recognized internationally and he gave invited talk at many international conferences. His contribution to scientific communities is also to be noted. He was a member of organizing committee of the 8<sup>th</sup> Asia-Pacific Microscopy Conference (2004), the 12<sup>th</sup> International Congress of Microscopy (2006) and the 12<sup>th</sup> Frontiers of Electron Microscopy in Materials Science (2009). He has also served as a member of the board of directors of the Japanese Society of Microscopy (2001–2005) and as an Executive Editor of *Microscopy* (2011–2019) and as an Editor-in-Chief of *Kenbikyō* issued by the Japanese Society of Microscopy (2011–2013).

For his achievements, he was awarded Achievement Award for Excellent Paper from the Japanese Society of Electron Microscopy (1998), the Seto Prize from Japanese Society of Microscopy (2003), Best Material Paper Award from the Microscopy Society of America (2008), Achievement Award for Excellent Paper from the Laser Society of Japan (2017) and an Honorary Member of the Microscopy Society of Thailand (2020).

Dr. Kurata's contribution to Kyoto University and the ICR through his scientific, educational and administrative activities is hereby greatly acknowledged.