Institute for Molecular Science (IMS) is one of the world's core research facilities for molecular science and is also a center for inter-university joint research in Japan. It sets an extremely wide range of research goals, from understanding the behavior of individual molecules to that of collective molecular systems. These molecular systems have close relation to scientific understanding of biology, engineering and space sciences. Currently, IMS is engaged in six (four plus two) areas of research: Theoretical and computational molecular science, Photo-molecular science, Materials molecular science, and Life and coordination-complex molecular science. Research Center of Integrative Molecular Systems (CIMoS) has started from April 2013 to develop the highly functional molecular systems such as molecular rhythms, sensing and response, and even self-repair. Starting from April 2017, Center for Mesoscopic Sciences (CMS) is launched to develop innovative methodology of studying mesoscopic molecular systems, covering from theoretical methods to leading-edge measurement methods. Division of Advanced Molecular Science is launched to promote outstanding research example of Molecular Science from April 2018. From April 2019, Division of Research Innovation and Collaboration is launched to strengthen the tie between the social activities. In addition to these research divisions, IMS has three research facilities; UVSOR Synchrotron Facility, Instrument Center facilitated with various molecular detectors, and Equipment Development Center. IMS also operates the Research Center for Computational Science, jointly with National Institute for Physiological Sciences and National Institute for Basic Biology in the same campus. Okazaki Institute for Integrative Bioscience (OIIB) has accomplished its role to foster new trends in bioscience research since April 2000, and starting from April 2018, Exploratory Research Center on Life and Living Systems (ExCELLS) is launched directly under the National Institutes of Natural Sciences.

Annual Review 2019 is a summary of research activities performed in IMS during September 2018–August 2019. The individual research groups at IMS are making steady progress in basic research on molecular structures, reactions and functions demonstrating "novel molecular capabilities," as reported in this Review. In addition to these individual activities, IMS conducts the six special programs in the institute basis: (i) Emerging innovation in computational science of energy from post-K computer; (ii) Development of cold-atom based quantum simulators and their applications to quantum computing within the framework of Japan's flagship program on quantum sciences and technologies "Q-LEAP" by MEXT (2018–2028); (iii) Nano science project, called Nanotechnology Platform from July 2012; (iv) Inter-University Network for Common Utilization of Research Equipments cooperated with 74 organizations; (v) Project on trans-hierarchical studies of materials and biological systems with molecular observations, as a joint program of NINS; (vi) IMS runs several international collaboration programs and also owns an internship program for young scientists: Institute for Molecular Science International Internship Program (IMS-IIP). IMS-IIP provides the opportunity of internship for young researchers (*e.g.*, master's and doctoral students, postdoctoral researchers and young faculty members of MOU partners) from overseas to stay in IMS laboratories.

Two new associate professors have joined the IMS faculty in the period of September 2018–August 2019. Dr. Tetsuro Kusamoto from the University of Tokyo joint Department of Life and Coordination-Complex Molecular Science and Dr. Emi Minamitani from the University of Tokyo became the member of Department of Theoretical and Computational Molecular Science. Professor Kusamoto majors to create novel photonic-electronic-magnetic functions based on molecules with open-shell electronic structures and Professor Minamitani majors theoretical studies on novel physical properties arising from many-body interaction. Two members of our faculty have left IMS but have became Project Professors of IMS. Professor Masahiro Katoh left for Hiroshima University but continues to contribute to IMS as an UVSOR Project professor and Professor Takunori Taira left for RIKEN but has become a Project Professor of our newly launched Division of Research Innovation and Collaboration. Professor Katoh will continue to further strengthen his study on UVSOR light source and Professor Taira will start our new trial for joint innovation with private industries simultaneously proceeding his national projects for laser development. Three faculty members, three associate professors have left IMS. Professor Yuji Furutani left for Nagoya Institute of Technology, Professor Takao Fuji left for Toyota Technological Institute and Professor Shigeyuki Masaoka left for Osaka University. We deeply thank to these three professors for their important contributions to IMS and wish success in their new environments. Many new talented young faculty members as assistant professors have joined IMS in this period and many have left. We sincerely thank their contributions to IMS and believe their success in the future. Also, Dr. Toshikazu Nakamura and Dr.Toshiyasu Suzuki, associate professors of IMS, became team leaders of Instrument Center, newly established positions to support Instrument Center director, Prof. Yokoyama. Assistant professor Shoji Tanaka became the researcher of our safety office to strengthen its function. Finally, we would like to thank long lasting contributions of Dr.Nobuhiro Kosugi and Dr.Yoshihito Watanabe to IMS who became emeritus professors of IMS.

IMS will continue to contribute to lead the Molecular Science together with many young promising and well-established senior scientists. This institute has been most benefited with your constant support and we do expect your further support and advice for creating this new era of molecular science.

September, 2019

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