

Okazaki Institute for Integrative Bioscience

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The main purpose of Okazaki Institute for Integrative Bioscience (OIIB) is to conduct interdisciplinary, molecular research on various biological phenomena such as signal transduction, differentiation and environmental response. OIIB, founded in April 2000, introduces cutting edge methodology from the physical and chemical disciplines to foster new trends in bioscience research. OIIB is a center shared by and benefited from all three institutes in Okazaki, thus encouraging innovative researches adequately in advance of academic and social demands. The research groups of three full professors and one associate professor who have the position in IMS join OIIB. The research activities of these groups are as follows.

Aono group is studying the bioinorganic chemistry of heme proteins that show a novel function. They elucidated the structure and function relationships of the heme-based sensor proteins in which a heme was the active site for sensing gas molecules such as CO and O₂. They also reported the structure and function relationships of aldoxime dehydratase, which is a novel heme-containing dehydrase enzyme. Kato group is studying structure, dynamics, and interactions of biological macromolecules primarily using ultra-high field nuclear magnetic resonance (NMR) spectroscopy. In particular, they conducted studies aimed at elucidating the dynamic structures of glycoconjugates and proteins for integrative understanding of the mechanisms underlying their biological functions. Kuwajima

group is studying mechanisms of *in vitro* protein folding and mechanisms of molecular chaperone function. Their goals are to elucidate the physical principles by which a protein organizes its specific native structure from the amino acid sequence. In this year, they studied folding pathways of homologous proteins, goat α -lactalbumin and canine milk lysozyme, by experimental and computational analysis. Fujii group is studying molecular mechanisms of metalloenzymes, which are a class of biologically important macromolecules having various functions such as oxygen transport, electron transfer, oxygenation, and signal transduction, with synthetic model complexes for the active site of the metalloenzymes. In this year, they studied molecular mechanisms of metalloenzymes relating to monooxygenation reactions and denitification processes.

OIIB is conducting the cooperation research program, "Frontiers of Membrane Protein Research," with Institute for Protein Research, Osaka University from 2005. In this program, the following projects have been carried out to elucidate the role of membrane proteins in life: (i) the development of expression systems, purification methods, and chemical synthesis of membrane proteins, (ii) the development of new methods for analyzing the structure and function of membrane proteins. As a part of this cooperation program, the 7th OIIB Symposium was held in Okazaki on November 12 and 13, 2008.