LIFE SCIENCE

SPring-8 operates many beamlines for Life Science experiments. Researchers from universities, private industry and government laboratories around the world use these facilities, and many studies have been reported not only of crystallographic but also of biological significance.

Seven state-of-the-art beamlines are provided for macromolecular crystallography. Many crystals of biological macromolecules have been analyzed, and their structures have been determined. The crystal structure of MinD from *Pyrococcus horikoshii* OT3, a septum site-determining protein, has been determined by the MAD method at BL41XU. This structure reveals the bacterial cell division control. The crystal structure of rat biliverdin reductase has been determined at 1.4 Å resolution at BL44B2. The complexes of biological macromolecules are important to understand the protein-protein or the protein-DNA interactions. The crystal structures of bovine milk xanthine oxidoreductase complexes have been determined both in the dehydorogenase and the oxidase form. The crystal structure of ferredoxin and ferredoxin-$NADP^+$ reductase complex from maize leaves has been determined at 2.6 Å resolution. The crystal structures of human prostaglandin D synthase have been determined, both with and without substrate analogs bound. These complex structures have been determined at BL40B2. The structures of the transcription factor, Runx-1/AML1 (Runt domain) and complexes with DNA reveal the mechanism of regulation of transcription at BL41XU and BL45XU. At BL45XU, designed by “trichromatic concept”, the bacterial flagellar protofilament structure has been determined from 5 μm thick crystals. Recently, a behavior of single molecular units in real time has been observed by a new method, the “diffracted X-ray tracking system.” Using this method, the Brownian motions of biological molecules can be monitored at BL44B2. At BL45XU, motion of activated myosin heads has been detected by fiber X-ray diffraction.

At beamlines for medical research, the high resolution synchrotron radiation X-ray microCT method has been developed, and by this method the three dimensional glomerular micro-structures have been visualized.

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