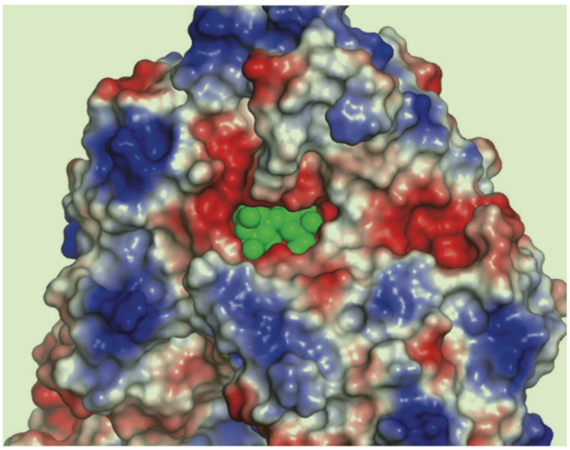
PHOTON FACTORY, IMSS, KEK

Merry Christmas and Happy New Year ! In this heart-warming season, we deliver our first facility information page of this year. First, we report on the international conference held at Tsukuba in August. This was organized by our institute, i. e., Institute of Materials Structure Science, to which PF also belongs together with other departments related to material science. The conference, which is named "Light and Particle Beams in Materials Science 2013", has included various materials in its scope, such as solids, catalysts, soft matter, biomaterials and so on, and one of the central issues was the cooperative use of available quantum beams, namely, synchrotron radiation, neutron, muon, and positron. In the following, we introduce two plenary lectures although the other plenary and parallel lectures have also attracted much attention. Prof. Y. Tokura from CEMS, RIKEN and University of Tokyo has presented his lecture on the "emergent" electromagnetism expected for the correlated electron systems, and showed the control of metal insulator transitions and the observations of topological spin textures like skyrmion. Prof. Z. Shen from Stanford University has summarized the very recent progress of photoemission studies in cuprates, and emphasized the interplay between the so-called pseudogap and high-Tc superconductivity. The photo is the scene during break time; from right to left, Prof. Y. Fujii at CROSS, Prof. Y. Endo at Tohoku University, Prof. P. Böni at Technische Universität München, Prof. K. Yamada and Prof. Y. Murakami both at KEK.

Next, we introduce one of our recent scientific outcomes related to ourselves, i. e., human beings. Bifidobacteria are known to live in human bowels and work as good bacteria. Also, it has been confirmed that they quickly proliferate in the babies given human milk. In the human milk, we find oligosaccharides that have complicated structures. A preceding study found that lacto-*N*-biose, which is a small unit of the oligosaccharides, plays the particular role as nutrition to the bacteria. As is easily imagined, the liberation of lacto-*N*-biose from the oligosaccharides is indispensable there and this is promoted by the enzyme called lacto-*N*-biosidase. The group led by Prof. S. Fushinobu at University of Tokyo has clarified the structure of this key enzyme by using the beamline BL-17A and explained the mechanism of the liberation. According to that, lacto-N-biosidase has a pocket that fits lacto-*N*-biose, as is shown in the picture. (The green part at the center is the lacto-*N*-biose released from the oligosaccharides. The surrounding part is lacto-*N*-biosidase.) This finding makes it possible to alter the enzyme so as to work in the reverse way, namely, to help the synthesis of human oligosaccharides, and will lead to future food development that will benefit our health.



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