



## I. Introduction

As the current issue illustrates throughout, 2010 was a fruitful year for SPring-8, making steady progress as one of the most advanced third generation synchrotron radiation facilities in the world.

Among the various scientific events, most worthy of note was the successful hosting of the 12th APS-ESRF-SPring-8 Three-Way Meeting in April 2010. Since 1994, the Three-Way Meeting has been organized regularly as the collaborative activity among the three third generation synchrotron radiation facilities. This time, in addition to satellite meetings on X-ray optics and user management, the workshop program included various sessions covering facility status, upgrade plan, accelerator/light source, detector/data handling, time-resolved nanofocusing/imaging, and industrial application. It was noteworthy, in particular, that the Three-Way Meeting welcomed PETRA III as a newcomer, which just started operation in November 2009. They made presentations about their new light source and detector development. This meeting was full of future-oriented reports and discussions lively. It was concluded that the three parties would continuously expand their collaborative relationships. The next Three-Way Meeting will be held at ESRF.

Regarding the outreach work of SPring-8, one of the most challenging activities of this year was the SPring-8 special lecture entitled "Science for Cultural Heritage Illuminated with Synchrotron Light," which was held in Nara, November 2010. Since synchrotron

radiation provides a means of advanced non-destructive analysis, cultural heritage scientists have gradually begun to realize how valuable and powerful it could be for safely revealing secrets hidden in ancient artifacts and art. This special program was organized to introduce this excellent potential of synchrotron radiation to the public. It was also aimed at researchers who study archaeology and cultural properties, where synchrotron radiation analysis is highly advantageous in identifying artifacts under study. In this lecture, it was shown that the synchrotron light at SPring-8 makes it possible to identify micro-artifacts that could not be examined before and that the elemental composition of artifacts determined by advanced X-ray analysis indicates their origins and manufacturing techniques. The scientific event was successfully held with more than 300 participants. As the next step, SPring-8 will encourage potential users to utilize SPring-8 actively.

In 2010, a review committee was formed for evaluating the Medical Bio Trial Use program, which was established to invite potential users from the domain, and for evaluating the Medical Bio EX program, established to expand target research areas using the beamlines for small-angle scattering and crystal structure analysis. These programs received a high evaluation because they increased the use of synchrotron radiation by new users, especially users from overseas and from the private sector, and promoted the application of

various analysis techniques to medical bio research. Although these programs were completed at the end of 2009B, it is the intention of SPring-8 to support prominent scientists continuously through research planning and data analysis, and to meet increasing expectations for research outcomes in the field of medical bio research, through which SPring-8 could substantially contribute to conquering diseases and to promoting healthier lives.

Regarding the SPring-8 beamline portfolio, there are two contract beamlines newly approved for construction in 2010. The first one is the Laser-Electron Photon II Beamline, to be constructed by the Research Center for Nuclear Physics, Osaka University. This is the second beamline dedicated to nuclear and particle physics experiments, and will realize a high-energy gamma ray beam with 10 times higher intensity than the existing one, and will be instrumented with a large-scale detector system mainly composed of a high-resolution spectrometer. The new beamline is expected to provide an ideal mean to realize a major breakthrough in quark nuclear physics including the conclusive judgment on the existence of pentaquark.

The other beamline is the Catalytic Reaction Dynamics for Fuel Cells Beamline, to be constructed by the University of Electro-Communications. During the course of realizing fuel cell automobiles, the function and lifetime of the PEFC cathode catalysts must be drastically improved. Towards this goal, the structure and electronic state of PEFC catalyst surfaces must thus be intensively investigated *in situ* during a voltage-stepping process in real time. This new beamline will be capable of providing the depth profiles measurements of XAFS as a function of

time and location for samples under investigation, which is currently considered to be the only possible characterization technique. These two new beamlines will be commissioned in FY2012.

Because SPring-8 is expected to continue growing as the world's leading research facility and keeps producing cutting-edge achievements, it is essential to provide users with not only state-of-the-art instruments but also a comfortable environment to facilitate their research activities. The SPring-8 User Information website was relaunched in November 2010, to improve the convenience of online proposal and document submission by users, publication registration, and so forth. The most significant feature of the new website is "My Page," where each user can obtain information about their status regarding the procedures required and user statistics for public beamlines after logging in. It is hoped that the new website will be helpful for users to complete their paperwork much more easily.

During this year, there has been steady progress in the SPring-8 upgrade plan, called SPring-8 II. The plan is required to meet all the critical scientific and technical challenges over the next ten years so as to dramatically enhance the capabilities of SPring-8. The working group has started considering what novel values one should scientifically and technologically create through upgrading the existing SPring-8 facilities. The 2nd Symposium of the SPring-8 upgrade plan was held in Tokyo, December 2010 with the aim of figuring out the future directions of SPring-8 by updating the status of the development plan. To continue meeting the needs of the synchrotron radiation research community, the working group is intensively working on an upgrade plan that will enable users to produce outstanding research results.

