Foreword

Toward New Dreams

Nano-Analysis Lab.

Yoshiki Seno

I remember some impressions that I had when I first visited a synchrotron radiation facility. It was the Photon Factory of KEK in Tsukuba, which was still under construction at the time, and I was a student. I could see immediately the linear accelerator, with a diameter of only a few millimeters but which extended for 400 m as the straight path for electrons. I remember that the cost of electricity to power the whole institute for a day was about the same as the energy consumption for 400 family homes for an entire year. I cannot forget the feeling at that time that it was like being in a dream world far from our real life. Twenty years on, the synchrotron radiation facility has become a true reality. Now, industrial engineers are encouraged to utilize national facilities such as KEK and SPring-8 for materials development. Even in our laboratory, SPring-8 is going to be an indispensable tool for our work. What was previously a dream has indeed come true.

Compared with laboratory equipment, the power of synchrotron radiation for materials analysis is huge. However, it is not easy to fully utilize the advantageous characteristics of synchrotron radiation. It depends a great deal on our skill as to whether we obtain good results or not. Since 1999, we have attempted to employ SPring-8 in many materials analyses. In the following article, we report a few of the results we have obtained using SPring-8, focusing on subjects involved in the major area of future advanced automobiles, such as rechargeable batteries and hydrogen containers. In addition, some techniques for the use of synchrotron radiation are reviewed. Investigation of new advanced techniques utilizing synchrotron radiation is important to develop our further materials research. Although the results we have obtained so far are limited, we fully intend to pursue these results toward truly valuable discoveries.

The automobile industry is currently turning toward new power sources, new lighter bodies, and new control systems as our new dreams for the future. Just as our dreams of synchrotron facilities have come true, so now should we take steps toward making these new dreams a reality.