

INDUSTRIAL APPLICATIONS

Since it found that there was a strong need for synchrotron radiation utilization research among researchers in the industry, JASRI has adopted various systems such as the coordination, the trial use and Large-Scale Advanced Scientific Facilities Strategic Utilization Proposal systems, which have been used continuously. After the introduction of the national project entitled the Large-Scale Advanced Scientific Facilities Strategic Utilization Program, the number of industrial applications has increased significantly.

Twelve experiments representative of the outstanding work carried out in the field of Industrial Applications in 2005B and 2006A are introduced here. Although the majority expert users had previously belonged to electronics, many researchers from other industrial fields, such as those involving nondestructive evaluation, fuel cells, hydrogen storage materials, polymers and cosmetics, are now joining SPring-8.

The very interesting experiments discussed in this section were performed using the following nine different beamlines, that is, three experiments were accomplished using the Surface and Interface Structures beamline BL13XU, two experiments were carried out using the Engineering Science Research beamline BL19B2, and the remaining eight experiments were performed using the Industrial Consortium beamline BL16XU, the Medical Imaging beamline BL20B2, the Hyogo beamline BL24XU, the Soft X-ray Spectroscopy beamline BL25SU, the White Beam X-ray Diffraction beamline BL28B2, the High Flux beamline BL40XU, and the Infrared Materials Science beamline BL43IR.

In the electronics field, which still supplies the majority of users, next-generation gate dielectric films, magnetic recording films, hard disk drives (HDD) and multilayer ceramics capacitors (MLCDCs) have been studied mainly by XRD, XMCD and IR. As examples of such studies, the strain observation in Si substrates used in LSI technologies indicated that the Si substrates with local strain have good crystal quality with very small strain, while strained Si substrates such as Bulk, SGOI and SSOI have large strain, but very poor crystal qualities.

Time-resolved studies of the electrochemical oxidation occurring in fuel cells and crystal structure analysis of unusual rare earth-Mg-Ni-based hydrogen alloys were introduced in the field of energy devices.

Studies on nondestructive evaluation using imaging techniques are valuable in the industry. In this section, a technique of three-dimensionally imaging crystal defects in single crystal CaF_2 materials for observing optics and fatigue cracks in structural components will be introduced.

One of the industries that are directly related to people's lives is cosmetics. The development of hair care products is of special interest to the cosmetics industry. XRD analysis of single-hair fibers will prove to be a very useful tool for determining the characteristics of hair.

It can be declared with confidence that the excellent research presented in this section provides good models for materials researchers and analytical scientists.

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