Industrial Applications

The fact that the number of users from industries and that of industrial companies at SPring-8 have been dramatically increasing shows that the utilization of synchrotron radiation has already become a commonly used technique in various industrial fields. This situation holds true not only for the public beamline but also for contract ones. Such an increase in the number of users from industry may be partially attributed to the recent intentional funding by government for the "Trial Use Program" aiming at the education of and assistance for industrial newcomers to SPring-8. In some technological areas like fluorescence analyses or X-ray reflectivity measurements, the present state of the activities for industrial application has become more advanced as compared with those in a few years ago in terms of measurement accuracy.

Some of the outstanding work recently achieved in industry is introduced here. Although major expert users have previously belonged to electronics, many researchers from other industrial fields, such as cars, new materials for functional devices, construction and cosmetics, are now joining SPring-8.

In the electronics field, which still supplies the majority of users, various types of memory or high-capacity storage devices, such as flash memory, digital versatile disk-random access memory (DVD-RAM) and magnetic hard discs (HDD), have been continuously popular materials for characterization, mainly by XPS, XRD and X-ray reflectivity measurements. As long as the crystal structures in bulk materials or at interfaces are sometimes closely related to the device performance and life or the production yield, research activities for those materials should continue for another decade.

Studies on the structures of or stresses in thin surface layers with and without coating films have also become popular as part of research into surface strengthening and the prevention of corrosion, rusting or crack formation. As examples of such studies the analytical results of toxic hexavalent chromium in metal coating layers, stress measurement results of laser-peened metals and X-ray diffraction results of dynamic phase transition in arc-welding metal layers will be introduced.

In the field of construction concrete strength, or its durability, is also a key issue since Japan often suffers from large earthquakes. It is effective to directly see the internal structure of concrete by an X-ray imaging technique to understand the deterioration mechanism of the concrete more clearly.

One of the industries that is more directly related to the people's lives is cosmetics. Hair treatment materials are of special interest to the cosmetic industry. Thus, the research of structures in treated hair using SAXS combined with an X-ray microbeam would be a rewarding target to elucidate how those materials affect hair, not only from the viewpoint of the industry's sales but also from that of human health.

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