MATERIALS SCIENCE :

"Mokusyungiku" - Marguerite

"Matsubaunran" - Linaria canadensis

STRUCTURE

Various unique structures were reported in Materials Science at SPring-8 this year. Fujihisa *et al*. succeeded in determining the incommensurate structure generated under high pressure, "Incommensurately Modulated Phase of Phosphorus under Pressure" by high pressure X-ray powder diffraction analysis. Their discovery, the displacive modulated incommensurate structure with only one atomic site position, was the third case after the reports on iodine and chalcogens in 2003. As shown in this article, the quality and reliability of powder data is increasing as well as making the complicated structure model building possible. The research and development in basic techniques for the high quality control of powder diffraction data at SPring-8 carried out in "Long-Term Proposal" and "Power(experienced) User Project" has been achieved in the following studies: "Direct observation of oxygen stabilization in layered ferroelectric $Bi_{3.25}La_{0.75}Ti_3O_{12}$" by Moriyoshi *et al*. and "Unique structures in yttrium trihydride at high pressure" by Machida *et al*. In these studies, accurate structure analyses for complicated structural systems were achieved. In addition, the direct observation of ferroelectric $Bi_4Ti_3O_{12}$ crystal growth using the Piezoresponce Force Microscopy (PFM) by Noguchi *et al*. was indirectly but strongly supported by the results of precise powder diffraction structure analysis, which indicates the evidence of no significant lattice change under the various oxygen pressure relating to crystal growth.

As studies representing the progress in data accuracy for structural study, the two articles are selected from the research area of surface and interface structure. One is "Structural characterization of Ar^+-irradiated $SrTiO_3$ showing room-temperature blue luminescence" by Shimakawa *et al*. and the other is "Multilayer relaxation of Ru studied by surface X-ray diffraction" by Nakamura *et al*. The importance and demands of the utilization of SPring-8 in this research area should increase in materials science and its industrial applications.

Five other emerging and unique studies are also selected this year as research frontiers of 2007. These research studies shall bring a new breakthrough to Materials Science in SPring-8 and may attract growing end user demands, which is not yet on the horizon.

Masaki Takata