

DIFFRACTION & SCATTERING

X-ray diffraction and scattering experiments were among the first studies to be conducted at SPring-8. Beamlines BL02B1, BL04B1, BL09XU, BL14B1, and others have been routinely used for such measurements, often taken under conditions of extreme temperature and high pressure. The prevalence of such studies shows the need for beamlines to be well equipped with cryostats, high-pressure cells, detectors, and other devices, even at a third-generation synchrotron facility.

Eight scientific works in the field of diffraction and scattering conducted at SPring-8 are presented in this volume. Three high-pressure experiments from BL04B1 and BL14B1 are described first. In-situ observation of the diamond formation process, a topic of particular interest among those studying high-temperature and high-pressure transformations, was carried out using an advanced SPEED 1500 apparatus. Kinetics of postspinel transformation in Mg_2SiO_4 under high pressure and temperature, and lattice modulation associated with spin ordering in CeP under high-pressure and low-temperature was also studied. Finally, a first-order liquid-liquid phase transition in phosphorus under high-pressure and high-temperature was observed for the first time.

Three structural studies from BL02B1 are presented as well. A small structural change in $h\text{-BaTiO}_3$, which would be extremely difficult to observe without third generation SR, was detected successfully. The phason strain in a quasicrystal was also reported.

The remaining two articles are related to nuclear resonance scattering and nuclear excitation experiments carried out at BL09XU. Local vibrational densities of dilute arrays of Fe atoms in metals were analyzed by nuclear resonant inelastic scattering. Nuclear cascade decay and a rather rare phenomenon called NEET (Nuclear Excitation by Electron Transition) were observed by taking advantage of high-energy synchrotron radiation at SPring-8.

Several new beamlines designated for use in diffraction and scattering experiments are currently under construction; however, it is too early to expect any scientific results from these new beamlines. Beginning in 2000, studies in diffraction and scattering at SPring-8 are expected to increase in number substantially

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