Instrumentation & Methodology

The development of new science is strongly related to the development of new experimental techniques or new instrumentations. High quality synchrotron radiation from SPring-8 has opened many new scientific fields. In this section, some of new instrumentation and methodology developed at SPring-8 are introduced.

The development of high quality diamond is required to provide high quality beams without sacrificing the high performance of the synchrotron radiation. Large synthetic IIa diamonds show a high quality with nearly intrinsic rocking curve widths. On the other hand, the evaluation of beryllium windows that limit the unique coherence of beams continues and a physical-vapor-deposited foil gave highly uniform beams compared with other conventional beryllium foils. These developments will open the door for the utilization of more highly coherent SASE FEL beams.

A novel hard X-ray micro-interferometer of the wavefront-division type has been developed using optics for an imaging microscope. The image of polystylene microparticles was clearly observed with a spatial resolution of 160 nm. Further improvement is expected with the development of optical elements.

Arbitrarily polarized X-ray beams were provided by a rotating four-quadrant phase-retarder system and polarization-dependent six-beam pinhole topographs were taken. The experimental topograph images agreed well with the simulated ones derived from the n-beam dynamical diffraction theory. A Sc/Cr multilayer was developed and applied as a phase plate in the soft X-ray region. It showed good performance as a polarizer and potential for use in a quarter-wave plate.

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