

High resolution powder diffraction at the Australian Synchrotron

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The 3 GeV storage ring of the first synchrotron to have been built in Australia is presently undergoing commissioning, and the initial five beamlines are being installed; the design and manufacture of a further four beamlines is ongoing concurrently. One of the first operational beamlines will be a powder diffraction instrument, located on a bending magnet source; this beamline is optimized for operation over the energy range 6 to 30 keV.

The photon delivery system has been manufactured at Oxford Danfysik in the UK; the main optical elements of the system are a vertically collimating mirror with variable incidence angle for optimal harmonic rejection; followed by a double crystal monochromator with sagittal focusing capability; and finally a vertically focusing mirror. The heart of the end station, the diffractometer, will be supplied by Rotary Precision Instruments, in the UK; the first X-ray detector on the beamline will be the MYTHEN, strip detector from the Paul Scherrer Institut, Switzerland.

The primary end station will be particularly suited to investigations requiring high resolution diffraction data from polycrystalline materials including: pharmaceuticals; solid metal oxides, such as the advanced materials used for magnetic, ferroelectric, catalytic and battery applications; microporous materials such as zeolites; and mining and minerals processing products, particularly under non-ambient conditions.

This beamline will be suited to range of experimental techniques including, Multiple-wavelength Anomalous Dispersion (MAD), *ab initio* structure solution, Pair Distribution Function (PDF) analysis, parametric temperature studies, and high pressure experimentation using a diamond anvil cell.

The powder diffraction beamline design and layout will be presented, in the context of some of the possible experimental applications.