

Non-ambient X-ray powder diffraction station for materials at NSRRC BL17A1

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Abstract

An optimized powder diffraction station suitable for soft materials under extreme condition was presented, which was equipped at wiggler beamline BL17A1 of the National Synchrotron Radiation Research Center (NSRRC). This beamline is fixed energy at about 9.3 K eV, which can provide low Q information down to 0.024 Å⁻¹ and moderate penetrate ability for general soft and chemical species such as polymer and liquid crystal samples by Debye Scherrer geometry.

The general operation temperature range for normal PXRD experiments are 100 K to 900 K, 1300 K is also possible. The extreme sample environment contain magnetic field (up to 1.8 Tesla at low temperature), electric field (maximum applied voltage: 10000 Volts). Varied temperature in-situ diffraction with gas-line and GIXS chamber with various kinds of gas supplied atmosphere are also designed for diffraction measurements. Some special modified diamond anvil cell suitable for low energy X-ray were also ready for soft materials under moderate high pressure (0.1-5GPa) and high temperature (~600 K), which shall be suitable for polymer's high temperature and high pressure studies.

For MOF materials, the gas – loading and desorption experimental system also can be used for loading kinds of different gases, the gas pressure rang can be from 0.1 bar to 50 bars. The technical details will be presented in the poster.

Keywords: WAXS, X-ray diffraction, Diamond anvil cell,