

At energies below 5 keV, x-rays cannot penetrate air or samples, and thus the typical hard x-ray experimental set-up must be modified. Thus the in-hutch instrumentation is maintained under He-atmosphere and upstream optics is maintained under vacuum conditions. At these energies, transmission measurements are generally not possible, and measurements are usually conducted in either fluorescence (using a PIPS or a Lytle detector) or electron yield (using a in-home electron-yield detector system) mode. In addition, post-sample energy calibration is not possible and calibrations must be done by running an appropriate calibrant scan at intervals between sample scans. Users are advised to bring their own calibrants. Experiments below 5 keV are possible primarily on BL 4-3 and BL 14-3b. BL 14-3 is has access to P edge (2.1 keV), unavailable on BL4-3.

The low-energy precludes standard cryostat applications. Low temperature/biological measurements can be performed in three ways: a) using a liq-He cryostream to cool the sample in an enclosed sample-space (temperatures as low as 50 K) b) using a contact-cooling liq-N<sub>2</sub> flow system (temperatures of -10 °C) c) a modified cryostat with higher beam permeability.