The medium energy x-ray facility beamline, or double crystal monochromator (DCM), is currently being designed at the Canadian Light Source (CLS). The proposed layout of the beamline, which is to be installed and operational on bending magnet 11B1.1 by January 2004, is shown in Figure 1. Design goals for the DCM are to provide photons between 1750-5500 eV with a resolving power better than 2000, and photon flux better than $10^{10}$ photons/second/100 mA/0.1% bandpass.

A set of indium antimonide crystals (InSb, 111 orientation) will be used over this photon energy range for XANES and XAFS-type experiments, for solving both research and industrial-type problems. Resolution ranges from 0.71-2.4 eV throughout the photon energy range for InSb crystals. Although InSb allows one to probe the important silicon K-edge at ~1840 eV, it has the disadvantage of poor thermal conductivity. Exposure to high heat loads from the CLS synchrotron on the 1st crystal (~41 watts of power for 2 mrad’s horizontal & ~0.26 watts/mm² power density) may cause crystal distortion and thereby resolution degradation through broadening of the crystal rocking curve.

A second set of silicon crystals (111 orientation) are proposed for higher resolution XANES work when required, for photon energies above the silicon K-edge. Resolution is almost constant for silicon crystals, ranging only from 0.92-0.96 eV throughout the photon energy range.

A harmonic filter mirror has been included in the design to reject 3rd order. This order rejection will be necessary primarily for work below about 2000 eV photon energy, such as that encountered for silicon K-edge work. SHADOW ray-tracing results show that the experimental focus should be 0.41 mm (horizontal fwhm) x 0.48 mm (vertical fwhm), when the CLS is operating under 2005 conditions.

---

Figure 1: Layout of the CLS Medium Energy X-ray Facility Beamline (DCM)

Submitting author: B. Yates, e-mail: byates@cls.usask.ca, FAX: (306) 966-6058