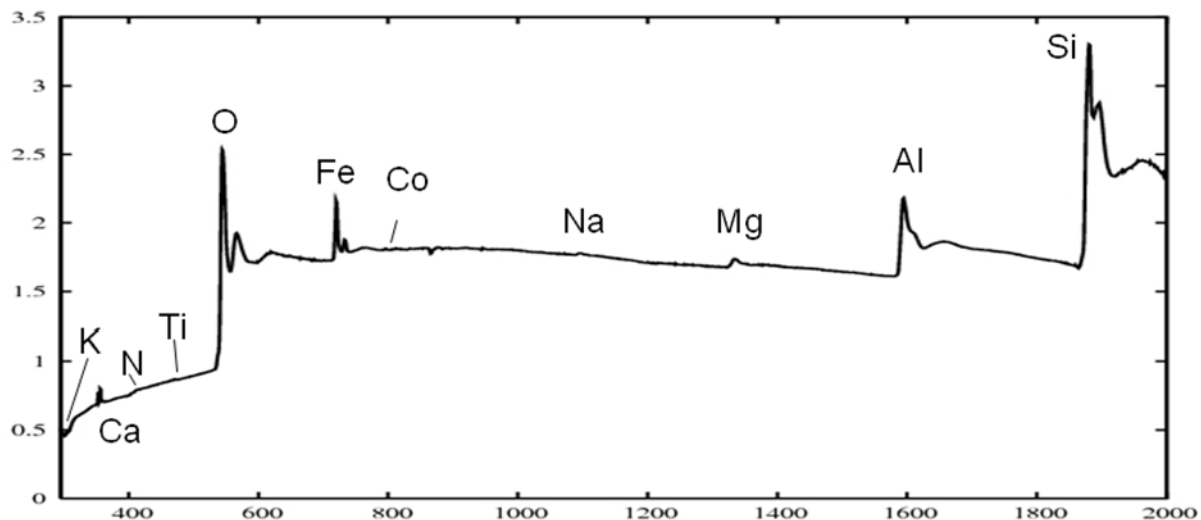


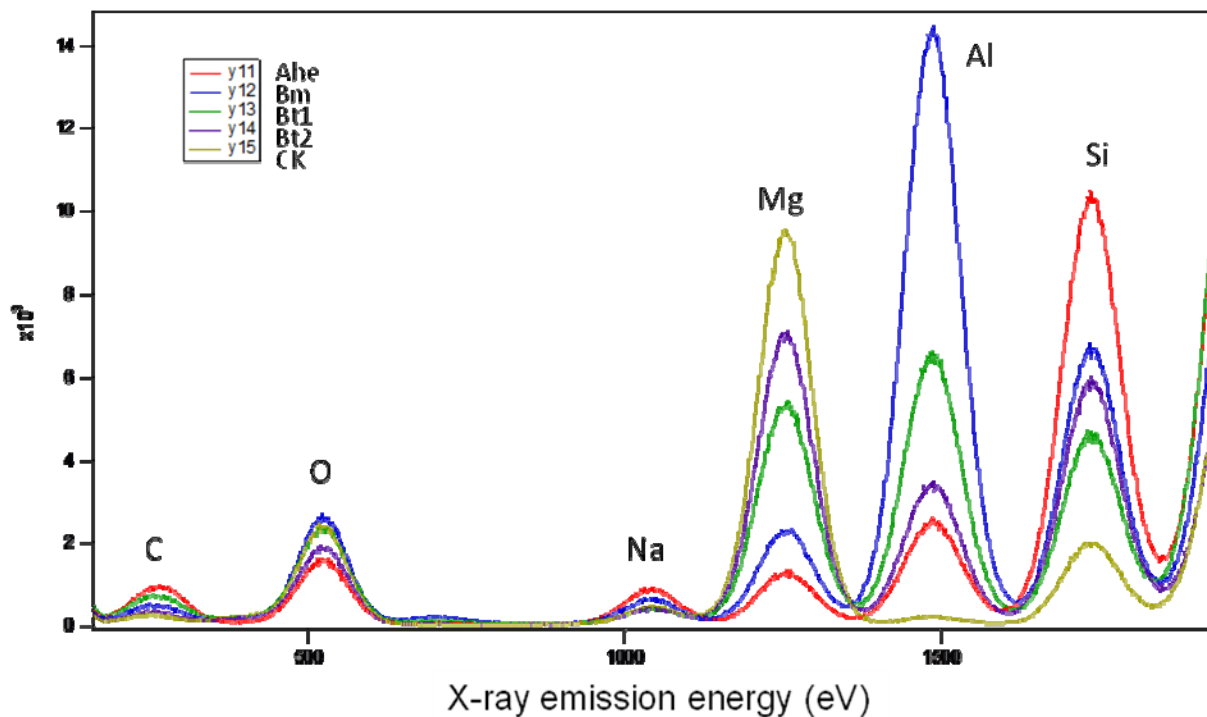
## *Spherical Grating Monochromator (SGM) Beamline*

This beamline operates within the energy range of 250 – 2000 eV. It is well suited for studies of materials containing elements with a low atomic number, such as carbon, nitrogen, and oxygen, that require surface sensitivity as the radiation is unable to penetrate far into the sample. Samples are typically measured as powders, thin film sections or crystals and can be measured at different temperatures.

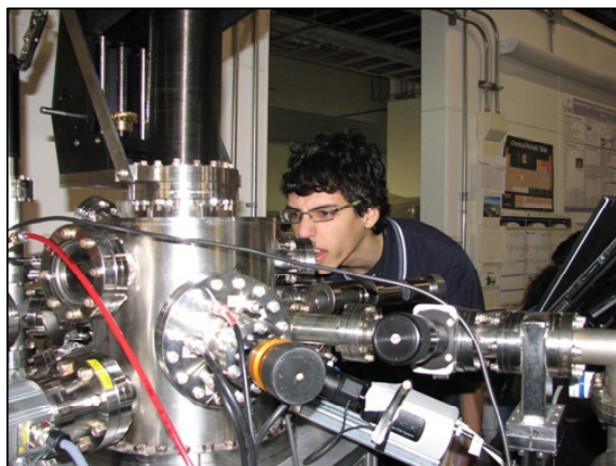
As the x-rays interact with the sample there are a number of measurements that can be taken. As the sample absorbs photons, the amount of absorption can be measured as the Total Electron Yield (TEY). Absorbing the x-rays causes the atoms to become excited. As they return to their rest state, they must release energy by emitting a particle. Photons in the visible range are measured as the X-ray Excited Optical Luminescence (XEOL); x-rays emitted are measured as the Total Fluorescence Yield (TFY); and electrons emitted are measured as the Photo Electric Spectroscopy (PES). TEY, XEOL, and TFY can be performed simultaneously and are used to determine the properties of the sample.



*This is an example of a TEY spectrum indicating the elements present in a soil sample (data collected by the first Students on the Beamlines high school group—possibly the first researchers to collect data on soil using soft x-ray—from St. Joseph High School in Saskatoon, SK.*



The first row transition elements, such as titanium, iron, nickel, copper, and zinc play a very important role in construction materials, catalysts, magnetic materials and other industrial applications. They also play a vital role in biological systems. The high flux, high-resolution soft X-ray capabilities of the SGM beamline provide unprecedented opportunities for rapid analysis of such materials.



*This student from Rigaud, QC is checking the location of his sample in the vacuum chamber as part of a Students on the Beamlines project.*