

Application of high energy resolution x-ray spectrometer to x-ray microprobe

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The x-ray fluorescence microprobe is used to measure trace element contents and their oxidation states in various samples. The intensity or the shift of the pre-edge peaks in the XANES spectra have been used to quantify the oxidation states of elements. High resolution x-ray spectrometer offers an independent way to quantify oxidation states. The spectrometer consists of a spherically bent analyzer crystal and a scintillator detector. It is ideally suited for x-ray microprobe because the tightly focused incident x-ray beam minimizes the source size contribution to the total energy resolution as well as increases the scanning range of the spectrometer.

In this work, a Si (333) analyzer was used to analyze K-beta and K-gamma fluorescence lines of Cr. The experiment was performed with a white focused beam at X26C beamline at the NSLS. The energy resolution of the spectrometer at 6 keV was 0.1 eV. The goal was to determine the amount of chromate (Cr^{6+}) by measuring shifts in the Cr fluorescence lines. Determination of chromate which is hazardous for environment is just one of the applications where this method will be important.