High Resolution X-ray Fluorescence Scanning Microscopy Abstract

Edith Carter, RET, Wayne State University, 2001

This project developed out of a need to have a scanning device, that could use x-rays to perform chemical analysis of specimens. At this time no such device exists, which provides suitable information and is non-destructive in sample preparation.

Currently, chemical analysis methods of specimens have several limitations:
Sample preparation (such as sample preparation time, ashing techniques, acid digestion, and electroplating) Matrix interference; Type of information obtained (primarily surface structure data) Therefore the intent of this project is to build and operate a new scanning x-ray fluorescence microscope. It is my specific task to conduct preliminary tests, operate, and establish graphic software for the new instrument.

Project Description

The project requires the mounting of a piezo stage (PZT) onto a standard x,y, stepping motor. This mount is then to be placed on a track associated with a beam-line (synchrotron source) located in the Chess facility at the Wilson Lab. The PZT stage is then placed in alignment with an x-ray beam generated by the Cesr synchrotron source.

Measurements of radiation are taken after the beam hits the sample target. These measurements are from fluorescent radiation given off by the target sample. The radiation is then detected, and a spectrum is produced, which can lead to chemical analysis of the target sample.

This summer due to the unavailability of beam-lines from Cesr, it became my task to modify the piezo stage for use on a traditional x-ray machine. After the modification, the piezo stage was taken to another lab for testing. It was my job to assemble the apparatus, move the piezo stage with computer commands (spec), and to take measurements of the radiation emanating from the target source (a razor blade).