A Bench-Top EXAFS Spectrometer based on Superconducting Tunnel Junction Detector Technology

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We have built a laboratory Extended X-ray Absorption Fine Structure (EXAFS) transmission spectrometer capable of measuring good quality data in a few hours. EXAFS is a powerful technique that gives element-specific structural and chemical information. Except for a handful of custom-built instruments, EXAFS as a technique is only available at synchrotron light sources. The development of a commercially feasible laboratory instrument is therefore a significant advance. While the current instrument is limited to the 500 – 1,200 eV soft X-ray region there is a clear path to developing a similar laboratory hard X-ray spectrometer working in the 3,000 – 10,000 eV region. Such a hard X-ray instrument would reduce the need to apply for access to synchrotron EXAFS and open up the technique for more general and routine chemical and biological applications

Our EXAFS spectrometer is spectrometer is based on Superconducting Tunnel Junction (STJ) technology coupled with a laboratory X-ray source. The resolution (~10 eV FWHM) of these cryogenic detectors coupled with their high count-rates (1000s counts/sec/pixel) allow the rapid measurement of good quality spectra. In this poster we describe the spectrometer, the underlying STJ detector technology, and present example F K-edge EXAFS data from LiF and MgF_2 thin films.

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