

Development of C K-edge NEXAFS techniques for the study of organic-mineral interfaces

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X-ray absorption spectroscopy at the C *K*-edge has great potential as a tool for understanding organic sorption mechanisms by mineral surfaces. By exciting core level electrons into unoccupied molecular orbitals the bonding environment and distribution of functional groups of C atoms can be probed. Measurements of bulk, untreated samples make the technique widely applicable for researching organic mineral interactions related to petroleum production, land reclamation and climate modelling.

Challenges related to C *K*-edge NEXAFS measurements arise from carbon contamination of the beamline optics, the presence of higher order light in the incident beam and sample decomposition due to the absorbed radiation. These challenges have limited the widespread use of bulk C *K*-edge NEXAFS for the study of environmental samples.

At the Spherical Grating Monochromator (SGM) beamline at the Canadian Light Source (CLS) a concerted effort is underway to validate C *K*-edge NEXAFS for environmental samples. The implementation of silicon drift detectors allows element-specific partial fluorescence yield measurements and an accurate normalization method. Slew scanning of the beamline energy coupled with fast data acquisition reduces beam damage and allows higher throughput. These improvements now allow the systematic measurements of a broad set of reference organo-mineral systems.