Hard X-ray Spectromicroscopy for Chemical and Structural Analysis of Selected Meteorites: Challenging Inhomogeneous Materials.

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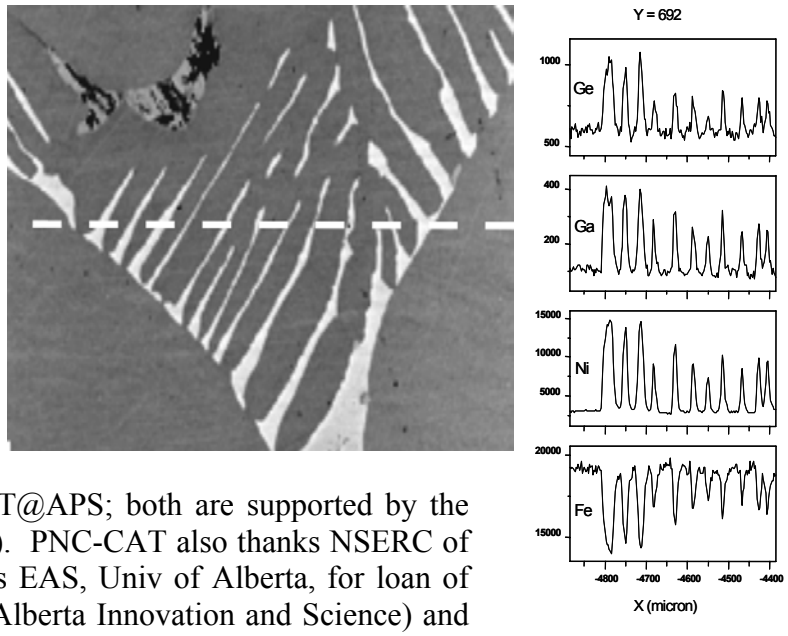
A focussed, micrometer dimensioned, hard X-ray beam is used to generate a two-dimensional map of the distribution of the elements present in typically inhomogeneous meteoritic samples including even those elements present in trace concentrations at (<100) ppm levels. These trace elements are used for the classification of the meteorites. Subsequent application of XANES and EXAFS to selected areas of interest provides confirmation of element identity, the chemical valence state and local structure information about the element. The inhomogeneous character of the samples can be illustrated by the image (Fig) of a sample with two intermixed Ni/Fe (either 30/70 or 7/93 ratios) phases. The area is approximately 450 micrometers square. The concentration profile across the sample (dash line) shows feature sizes of 10 to 50 micrometers. We also find (via EXAFS) that the trace elements (Ga and Ge) are components of the major phases and not grain boundary impurities.



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