Spectral tomography for 3D mineral and chemical analysis

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A new analytical tool for mineral analysis will be introduced: Laboratory-based Spectral 3D X-ray Computed Tomography (Sp-CT). Results from a spectral imaging detector, prototype installed inside a TESCAN CoreTOM micro-CT system, will be presented and discussed in the context of mineralogical and chemical analysis of geological materials. The technique will be demonstrated to allow:

a) 3D mineral classification from the transmitted energy spectrum characteristic of a mineral phase.

b) Quick bulk chemical quantification of heavy elements with K-edge > 20 keV at high concentrations that are difficult to analyse by other methods.

c) Reducing common CT artefacts such as scattering and beam hardening, as well as improved contrast by selectively choose the most convenient energy range.

The advantages of Sp-CT will open new possibilities in geometallurgy and minerals processing research to move from the predominant 2D based image characterization towards more representative 3D characterization. These are fundamental steps to enable automated and routine 3D characterization that ultimately has the potential to provide faster and lower cost analysis to, for example, the mining industry, as well as more comprehensive rock characterization technique for Earth sciences research.

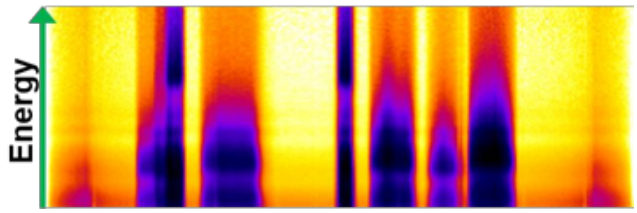

Fig.1: Energy spectrum of X-rays transmitted through particles with different K_{edge}. Darker indicate high absorption.