Electronprobe microanalysis of SnO_2-CuFeSnZn sulphide ore

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The electronprobe microanalyzer (EPMA) has become the state-of-the-art tool in earth science for the accurate analysis of not only the major but also minor and trace element compositions of minerals and ores.

Besides the conventional wavelength dispersive spectrometers (WDS) for very accurate composition determinations, EPMAs nowadays have a fully integrated energy dispersive spectrometer (EDS) which will provide for fast full spectrum scan of elemental composition. The EDS results, especially for the heavier elements, are quite close to that of the WDS.

A SnO_2-CuFeSnZn sulphide ore was the subject of compositional analysis by three different makes of EPMAs. The CuFeSnZn sulphide minerals include:

stannite	$Cu_2(Fe, Zn)SnS_4$
kesterite	$Cu_2(Zn, Fe)SnS_4$
stannoidite	$Cu_8(Fe, Zn)_3Sn_2S_{12}$

Besides obtaining accurate quantitative analyses of the various CuFeZnSn sulphide species present, line analyses can be performed as well as X-ray BSE maps which show the concentration of each element versus a colour scale and the area fraction of each concentration segment.

There is also the option of making an overlay of 3 or more different X-ray maps where each element is assigned a certain colour. These maps provide easier differentiation of the various phases present.

The accurate identification of mineral phases by the EPMA together with powerful image processing software and image analysis packages, paragenesis of an ore is greatly enhanced and the resulting maps of mineral distribution will ultimately simplify extraction procedures.

The attachment of an energy dispersive spectrometer to the scanning electron microscope (SEM) has also become standard for the geologist. The analytical data from such setups have also proved to be good and reliable with powerful new image processing and analysis software that are specially designed for SEMs.

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