

# **Trace element compositions of micro inclusions extracted from mixed LA ICPMS signals and their use in exploration**

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Micro-inclusions in minerals carry valuable information on co-crystallising assemblages in magmatic rocks or on the conditions of formation of the host minerals in alteration assemblages. They are often too small to obtain confident analyses by LA ICPMS but are frequently ablated accidentally when analysing host minerals for mineral chemistry or geochronology. Currently they are mostly excluded from the integration intervals at data reduction stage, but such mixed analyses have potential to extract trace element compositions of micro-inclusions keeping in mind that care should be taken due to differences in matrix effects between the host mineral and micro-inclusions and other similar issues.

We explore an approach utilising individual readings (sweeps) within the LA ICPMS signal and their individual quantification. Downhole fractionation correction is essential for such quantification and appropriate standard is needed based on signal drop off during LA ICPMS analysis. Usually sweeps form a trend with particular ratio of trace to major elements and then quantification is done by projecting to a particular concentration of the major element. To prove validity of such approach we compare our results with the compositions measured independently using EPMA and LA ICPMS on inclusions that were large enough for confident analyses.

We will show several examples of the extracted compositions of micro-inclusions from two different environments – magmatic and hydrothermal. Example from magmatic environment will include examples of apatite inclusions in zircons from different porphyry Cu deposits. The examples from hydrothermal environment would be the compositions of rutile, titanite and zircon inclusions in chlorite and white mica in different alteration zones around porphyry Cu deposits. We will show that compositions of inclusions could be extracted from mixed LA ICPMS signals, how their compositions could be used in exploration and that using them together with the composition of host mineral can improve targeting outcomes.