# Quantitative microstructural and trace element geochemical analysis of a mineralogically zoned vein

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The distribution of trace elements in refractory heavy minerals is a potential pathfinder for economic ore deposits, yet there is still little understanding of the controls on trace element partitioning and redistribution in complex ore systems. We undertake a detailed micro-analytical study of a small, yet complex, vein associated with a Pb-Zn-Cu-Ag-Au deposit. The dolomite vein cross cuts a quartz rich host rock that accommodates sulphide and iron oxide mineralisation in the adjacent wall rock. Simultaneous large area EBSD and EDS mapping of the vein and surrounding wall rock reveals systematic zoning of phases away from the vein walls into a deformed host rock with little evidence of post-vein deformation. LA-ICP-MS mapping shows trace element zoning within the vein as well as the surrounding pyrite and reveals late stage mobility of Ba and Sr not evident in the EBSD data. Pyrite is a common phase in the deposit and the As content may be an indicator of Au mineralisation. The behaviour of many other trace elements such as Ba, Cd, Cu, Pb, Ni, Sb, Sn, Sr and Zn, which associate with base metal mineralisation, partition into alteration phases and relate to the formation of the dolomite vein. This approach of integrating multiple techniques means quantative trace element data can be spatially correlated with phases, microstructure, and distance from the vein. This approach potentially enables the chemical fingerprinting of a yet unidentified or buried ore deposits from the examination of distal samples.