

## **Minor- and Trace Element Composition of Fahlores from the Western Greywacke Zone (Tyrol, Austria): Chemical Proxies for Provenance Studies**

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The western Greywacke Zone can be subdivided in four Variscan covers with large ore deposits. For this reason the western Greywacke Zone is of particular importance for the investigations in the framework of SFB (special research project) HiMAT (historical mining activities in Tyrol and adjacent regions) project and the investigations concerning historical and prehistorical ore provenance.

In the lowermost Alpach Unit the deposits of Röhrebühel near Kitzbühel contain fahlore and chalcopyrite the host rocks are Palaeozoic metasediments (Wildschönau Schists). The Devonian carbonates of the overlying Hohe Salve Unit are important host rocks for a couple of important mining districts such as the fahlore district Schwaz-Brixlegg in the lower Inn valley.

In the mining district of Schwaz most of the ore bodies show discordant vein and replacement mineralizations but at least two layered ore bodies are developed sub-parallel to the strata. Fahlores exhibit a complex zoning pattern with a strong varying chemical composition. 21 elements were measured with peak counting times of 50 seconds by WDS EMPA analyses on 500 spots all over different samples of Schwaz and Brixlegg. The major elements discriminate the fahlores as Zn-Fe tetrahedrite-tennantite solid solutions with a wide range in the Zn/Fe ratio and the As and Sb content. Hg and Ag are the most important trace elements. In some samples from Schwaz, Hg can be considered as major element with concentrations up to 4.5 wt.%. In Brixlegg Hg never exceeds 2 wt.% with a mean value of 0.9 wt.%. The Ag content of the fahlores ranges between 0.15 and 0.80 wt.% in both localities. The maximal Bi, Cd, Au and Pb content decreases in this order from 0.36 wt.% Bi to 0.24 wt.% Pb. However these elements are in some analyses also below the detection limit. Sn, Co and Mn are rarely detected with contents below 0.20 wt.%. The elements Te, Se, Ge and Ni are always below or near the detection limit.

The mining district Röhrebühel near Kitzbühel is located in the Wildschönauer Schiefer of the Alpacher unit. The fahlore mineralizations are strata concordant as well as strata discordant. Remarkable is their vicinity to and possible association with basic volcanites. The fahlore composition can be described as Fe-rich tetrahedrite-tennantite solid solutions with up to 1.6 wt.% Ag and 0.7 wt.% Hg, however these elements are sometimes also below detection limit. The highest concentrations of Ni and Bi reach 0.25 wt.% whereas Cd, Co, In and Pb range in the concentration interval of 0.1-0.2 wt.%. These preliminary data provide the basic geochemical frame for further metal provenance studies, associated with prehistoric mining activities in the Tyrol.

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