UV-fs-LA-ICP-MS analyses of fluid inclusions: Insights into the formation of tin ore deposits

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The transport and enrichment of metals in the earth crust is under control of magmatic and hydrothermal fluids. LA-ICP-MS analyses of fluid inclusions from ore deposits and controled HP/HT experiments may provide information about the mechanisms resulting in metal enrichment in ore forming fluids.[1] With a novel analytical method composed of a UV-fs-LA-SF-ICP-MS in combination with a heating-freezing cell [2], accurate and precise analyses of small fluid inclusions (>8μm) have been conducted. The inclusions have been analysed in the frozen state, which resulted in a high succes rate (>90%) due to a very good control during the opening procedure of the inclusions. Here, we present data of inclusions from different tin-bearing granites.

The transport of Sn and W in hydrothermal fluids is assumed to occur as chlorides ($SnCl_2$) or fluorides (SnF_4).[3] By comparing samples from tin granites of the Altenberg-Teplice caldera (Erzgebirge), representing F-rich fluids, and Cornwall (UK), representing Cl- and B-rich fluids [4], we expect to get new insights about both transport mechanisms. We investigated fluid inclusions from the granites and the mineralized veins of each location to gain new information about both, the magmatic pre-enrichment of metals and the hydrothermal evolution of ore forming fluids.

Fluid inclusion trace element data from a miarolitic quartz of the Zinnwald Sn-W deposit (Erzgebirge) show a continuous depletion of metals during the hydrothermal stage. Genetically older inclusions (330 μg/g Sn, 150 μg/g W) have higher metal contents than younger inclusions (< 5 μg/g Sn, < 1 μg/g W). Hypersaline primary inclusions in the associated granite show up to 700 μg/g Sn and 200 μg/g W. These findings indicate that initial fluids were capable of leaching Sn-W pre-enriched zones. The results will be compared to ongoing studies on tin granites from Cornwall.

[1] Heinrich *et al*. (2003), *Geoch Cosmoch Ac,* **67**, 3473-3496. [2] Albrecht *et al*. (2014), *J Anal Atom Spectrom,* **29** *(6),* 1034-1041. [3] Duc-Tin *et al*. (2007), *Geoch Cosmoch Ac*, **71**, 3323-3335. [4] Müller *et al* (2006), *Eur. J. Mineral*., **18**, 429-440.