# Partitioning of Sn and W between granitic melt and aqueous fluid

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The occurrence of cassiterite and wolframite in the same hydrothermal veins has contributed to the traditional view that Sn-W mineralization is formed by a magmatic fluid into which both Sn and W partition upon exsolution from a peraluminous or metaluminous granitic melt [1]. Experimental studies on fluid-melt partitioning, however, provide little support for such a model. Available data for tin suggest that it is retained in the melt [2,3,4]. Data for W are inconsistent with studies reporting preference for the fluid [5,6] or for the melt [7] at similar conditions. This discrepancy may be related to experimental uncertainties [3,5], which points to the need for clarifying further studies.

We studied fluid-melt partitioning of Sn and W for a range of starting compositions that are representative for natural magmatic fluids and melts typically related to Sn and W mineralization. In contrast to earlier studies, we did not use doped glasses, but equilibrated cassiterite and ferberite crystals with aqueous fluid (2 molal (Na,K)Cl±0.1 molal HCl) and granitic melt produced from haplogranite glasses (ASI 1.0 or 1.3) or Macusani glass at 750 °C, 200 MPa. We analyzed reacted glasses by EMP and LA-ICP-MS, trapped fluid inclusions by LA-ICP-MS [5], and quenched and centrifuged fluid by ICP-MS.

The first data in this ongoing study indicate partitioning of Sn into the melt and of W into the aqueous fluid. The tungsten concentration in the fluid inclusions was significantly higher than in the quench fluid, and lower in the produced glass than reported from comparable experiments using doped glasses [5,6,7]. The different fluid-melt partitioning of tin and tungsten implies that hydrothermal tin and tungsten mineralization do not originate from the same exsolved magmatic fluid. This is in very good agreement with geologic observations, such as quartz-wolframite veins crossing greisen veins.

[1] Heinrich (1990) *Econ Geol* **85**, 457-481. [2] Nekrasov *et al*. (1980) *Dokl Akad Nauk SSSR* **252**, 165-168. [3] Keppler & Wyllie (1991) *Contrib Mineral Petrol* **109**, 139-150. [4] Hu *et al*. (2008) *Geochem J* **42**, 141-150. [5] Schäfer *et al*. (1999) *Am Mineral* **38**, 563-598. [6] Manning & Henderson (1984) *Contrib Mineral Petrol* **86**, 286-293. [7] Bai & Koster van Groos (1999) *Geochim Cosmochim Acta* **63**, 1117-1131.