

## 学位論文要旨

### The mineralization of the Woxi Au-Sb-W deposit, western Hunan, China

梁翼

(中国湖南省西部の沃溪 Au-Sb-W 鉱床における鉱化作用)

The Woxi Au-Sb-W deposit in the western Hunan Province, China, is of hydrothermal vein type characterized by a rare mineral assemblage of stibnite, scheelite and native gold of which gold fineness ranges from 998.6 to 1000. The mineralization sequence observed in the deposit is, from early to late, coarse-grained pyrite – scheelite – stibnite – Pb-Sb-S minerals – sphalerite (+ cubanite) – fine-grained pyrite. Native gold might have precipitated with scheelite.

Microthermometric and LA-ICP-MS analyses of fluid inclusions in scheelite, quartz associated with scheelite and stibnite and barren quartz clarified that there might be at least three types of hydrothermal fluids during the vein formation in the Woxi deposit. Scheelite and native gold precipitated from the fluid of high temperature and salinity with high concentrations of metal elements, followed by stibnite precipitation. The later fluid of the highest temperature and salinity with low concentrations of the elements yielded the sphalerite mineralization. The latest fluid of low temperature and salinity with low concentrations of the elements is observed mainly in barren quartz. The remarkably high Au/Ag concentration ratios determined in the fluid inclusions in scheelite might be the reason for the extremely high gold fineness of native gold.

Concentrations of dissolved gold and silver species in hydrothermal fluids equilibrated with Au-Ag solid solutions have been calculated at wide conditions on the well known  $fO_2$ -pH spaces. Ratios of the total concentrations of dissolved gold and silver species ( $\Sigma Au/\Sigma Ag$ ) are higher as pH higher and  $fO_2$  lower. The ratios are constant at very low and high pH conditions where major dissolved species of both gold and silver are chloride complexes and thio complexes, respectively, while the ratios practically depend only on pH at intermediate pH conditions where  $Au(HS)_2^-$  and  $AgCl_2^-$  are major. The calculated results indicate that the solid solutions of high gold finenesses may precipitate from the fluids of low ratios of the total concentrations of dissolved gold and silver species when the conditions are (1) low pH's and/or (2) high concentration ratios of dissolved chlorine and sulfur and/or (3) high temperatures.

Compositional data of the fluid inclusions in scheelite from the Woxi deposit indicate that the extremely high gold finenesses of the native gold in the deposit might be caused by high Au/Ag concentration ratios and high temperatures of the ore-forming fluids.