岩石学报
ACTA PETROLOGICA SINICA

刘晓菲,袁顺达,王旭东,吴胜华,原垭斌. 2013. 湖南金船塘锡铋矿床流体包裹体特征及矿床成因的初步研究. 岩石学报, 29(12): 4245-4260

湖南金船塘锡铋矿床流体包裹体特征及矿床成因的初步研究

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基金项目：本文受国家重点基础研究课题（2012CB416704）、中央级公益性科研院所基本业务费专项资金（K1204）、国家自然科学基金项目（41173052、41373047、40903020）及公益性行业基金（200911007-11）联合资助

摘要：

金船塘锡铋矿床是东坡矿田内一个以锡铋为主的大型矽卡岩型多金属矿床，其成矿流体演化及成矿机制是理解该区花岗岩浆演化与成矿的关键内容，但迄今为止对其成矿流体演化及成矿物理化学条件尚无人研究。本文以金船塘锡铋矿床为研究对象，在详细野外调查的基础上，系统开展了镜下观察、流体包裹体显微测温以及激光拉曼分析，进而对金船塘矿床的地质特征及流体演化过程进行了初步研究，并获得如下认识：（1）该矿成矿演化过程可划分为原生矽卡岩阶段、退化蚀变阶段、云英岩阶段、锡石硫化物阶段及无矿石英-碳酸盐阶段；（2）成矿流体的成分以H_2O为主，气相成分中含少量的CO_2、CH_4、SO_2，子晶成分主要为NaCl，含有少量的KCl，成矿流体为H_2O-NaCl（±KCl）-CO_2（±CH_4）体系；（3）矽卡岩阶段中流体包裹体均一温度分布在174~>550℃，但主要集中在550℃以上，其盐度范围为5.41%~15.3% NaCleqv；退化蚀变阶段均一温度范围为143~>550℃，主要集中在230~300℃，盐度范围为1.22%~37.4% NaCleqv；云英岩阶段均一温度分布于220~500℃范围内，主要为240~350℃之间，盐度范围为3.0%~14.3% NaCleqv；锡石硫化物阶段中的包裹体均一温度分布于170~368℃，主要为220~270℃，盐度分布在0.35%~7.86% NaCleqv。总体上从成矿早阶段到晚阶段，成矿流体总体具有向低温、低盐度方向演化的趋势。成矿流体的总体密度分布在0.65~1.0g/cm^3之间，矿床形成的压力约为120~200MPa，对应的成矿深度约为4~7km；（4）早期成矿流体以岩浆水为主，在演化过程中有大气降水的加入，流体降压沸腾作用和流体混合作用可能是矿石沉淀的主要机制。

英文摘要：

The Jinchuantang deposit is a large-sized skarn-type tin-bismuth polymetallic deposit in the Dongpo ore field, therefore the evolution of ore-forming fluid and the mechanism of polymetallic mineralization of this deposit are crucial to understand the evolution of granitic magmatism and related metallogenesis in this region. But little has been known about the evolution of ore-forming fluid and physicochemical conditions of ore formation in the Jinchuantang deposit so far. Based on detailed field investigation of the Jinchuantang tin-bismuth deposit, we have carried out systematic microscope observation, detailed micro-thermometric measurement of the fluid inclusions, and Laser Raman spectroscopic analysis, and preliminarily discussed the geological characteristics and fluid evolution of the deposit. The following conclusions have been obtained: (1) The mineralizations of the Jinchuantang deposit can be divided into five stages, i.e., the skarn stage, retrograde stage, greisen stage, cassiterite-sulfide stage, and barren quartz-carbonate stage; (2) The composition of the ore-forming fluid is mainly H_2O, and there is a little CO_2, CH_4, SO_2 in the gas phase, and the daughter mineral component is mainly NaCl, containing little KCl, and therefore we consider that the ore-forming fluid belongs to system of H_2O-NaCl(±KCl)-CO_2(±CH_4); (3) The homogenization temperatures of the fluid inclusions range from 174℃ to >550℃ (mainly above 550℃) and the salinities are between 5.41% and 15.27% NaCleqv in the skarn stage; the homogenization temperatures of the fluid inclusions range from 143℃ to >550℃ (concentrated in 230~300℃) and the salinities range from 1.22% to 37.41% NaCleqv in the retrograde stage; in greisen stage, the homogenization temperatures range from 220℃ to 500℃ (mainly 240~350℃) and the salinities are 3.0%~14.3% NaCleqv; in cassiterite-sulfide stage the homogenization temperatures range from 170℃ to 368℃ (concerntrated in 220~270℃) and the salinities are 0.35%~7.86% NaCleqv. In general, the ore-forming fluid has a tendency to become low temperature and low salinity from the early to late stage, the density of the fluid is about 0.65~1.0g/cm^3, the pressure is 120~200MPa, and the corresponding metallogenic depth is about 4~7km; (4) The ore-forming fluid was dominantly magmatic origin, with the progressive mixing with cooler meteoric water in the process of fluid evolution, and the fluid boiling induced by pressure decrease and the mixing of high and low temperature fluids maybe the main mechanism for cassiterite precipitation.

关键词：金船塘 锡铋矿床 流体包裹体 成矿机制

投稿时间： 2013-07-19 最后修改时间： 2013-11-03