1 Introduction

Badu gold deposit, located in the southwest of Tianlin county, Guangxi province, is a micro-disseminated gold deposit occurred in Diabase. Besides, there are several other gold deposits occurred in Diabase in northwestern Guangxi. Because of these gold deposits relating to diabase intrusions spatially, some researchers called them diabase-type gold deposit (Xiao, 1997; Pan et al., 1998). There are few previous studies involving ore-forming fluids in the diabase-type deposits (Hu et al., 1995). The genesis of this type gold deposit is still unclear. Fluid inclusion and REE data in this study provide some clues to ore genesis.

2 Geological Setting

The Badu gold deposit is located to the west of Baise fault in the Youjiang basin (Pang et al., 2014). It lies on the core of southwestern plunging part of Badu anticline. The strata in ore district include Devonian, Carboniferous, Permian and Triassic. Sedimentary rocks consist of fine clastic rocks, carbonates, siliceous rocks and transitional type between them. Diabase of Hercynian and Indonian intruded into these strata. Northeast striking faults are parallel to axis direction of the anticline, whereas northwest faults cut across the former and some diabase stocks. Ore bodies occurred in fractured diabase, and in siltstones of Youjiang Formation of lower Devonian and Linghao Formations of lower Permian. Quartz, sericite, pyrite, arsenopyrite are main hydrothermal minerals related to mineralization.

3 Fluid Inclusion Assemblage in Quartz

Samples for fluid inclusion study were collected from quartz vein in altered diabase orebody. Petrography observation shows that there are two types of quartz (Fig. 1). The dark quartz, in the upper right and lower left of the microphotograph, are unclean and has lots of cracks. The bright quartz, in white dashed box and upper left corner, are clean and no visible cracks. The black minerals surrounding bright quartz or nearby are pyrite and arsenopyrite. Fluid inclusions in dark quartz are almost all secondary. But we found a primary three-phase fluid inclusion assemblage (i.e., FIA, Fig. 2) in bright quartz. The size of these inclusions ranges from 7 to 22 μm. Micothermometry and Raman microspectrometer analysis of this FIA were carried out in Guilin University of Technology. REE were measured at ALS Chemex.

Fig.1 Microphotograph of two types of quartz from the Badu deposit.

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The melting temperatures of solid CO2 (Tm,CO2) of three inclusions are all -59.3 °C, which below the triple-phase point (~-56.6 °C) of CO2, suggest that there are minor amounts of dissolved components in the carbonic phase. The clathrate melting (Tm,cla) occurs at 14.5 °C (homogenized to vapor phase), corresponding salinities between 5.7 and 17.5 wt.% NaCl equiv. The FIA are totally homogenized at temperatures ranging from 335 to 337°C (Th). The Raman spectroscopy showed that the vapor-phase inclusions mainly composed of CO2, and with a certain amount of CH4. The fluid belongs to CH4-CO2-H2O system. Based on CO2-CH4 system V-X phase diagram (Thiéry et al., 1994), the estimated molar fraction of CH4(XCH4) is roughly 0.13 and molar volume 68.5 cm3/mol. According to CO2-CH4 system ρ-XCH4-Th diagram (Swanenberg, 1979), the liquid density is about 0.22g/cm3 (i.e. low-density).

4 REE Analysis

Total REE concentrations at the Badu deposit vary from 0.29 to 96.7ppm. ΣREE for sandstone, diabase and ore are 463.67, 171.74 and 144.34ppm, respectively; δCe 1.04, 1.03 and 1.02; δEu 0.78, 1.24 and 1.02. Europium shows negative anomaly for sandstone and positive anomaly for diabase and ore (Fig. 4).

5 Conclusions

Ore forming fluids of the Badu gold deposit are mesothermal and CO2 rich fluids relating to magmatic activity of diabase. The ores are product of postmagmatic hydrothermal fluids.

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References