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Ar-Ar Geochronology Study on K-feldspar in Xishan W-Sn Ore Deposit in Yangchun, Guangdong Province

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1 Introduction

Yangchun basin locates in the west of Guangdong Province, where more than 50 deposits have been discovered to date, including Xishan W-Sn deposit, Shilv Cu-Mo deposits, Tiantang Cu-Pb-Zn polymetallic deposits, etc. The typical mineralized elements regionally including Cu, Fe, Pb, Zn, W, Sn and so on, while the characteristic ore-forming environments in this area mainly are porphyritic rocks, skarn rocks, tectonic alterized rock and hydrothermal veins. Two types of granites have been identified. one is mainly biotite-bearing granite, coming with W-Sn mineralization, the others are mainly granidiorite or monzonitic granite, where Fe-Cu mineralization occur (Yu et al., 1988, Chen et al., 1998, Ling et al., 2006, Mao et al., 2009, Chen and Wang, 2012).

2 Ar-Ar Geochronology Study of Xishan W-Sn Deposits

Xishan granitic rocks have been studied through the last few decades, more of which focus on the geology, geochemistry and fluid inclusion, reaching the conclusion that the Xishan granite is the result of typical fractionation and crystallization.

Several studies have been done on timing the mineralization of Xishan deposit. During 1980s, two K-Ar ages of biotites in granite have been reported, yielding ages of ca. 81Ma and ca. 76Ma separately. Recently, a systematic geochronology study on the Xishan granite has been carried out, the zircon U-Pb isotopic age on LA-ICP-MS is 103±3Ma, meanwhile the work group has successfully achieved the age data from Rb-Sr isotopic analysis of ore-bearing quartz vein in Xishan deposits, and the result is 93±12Ma, which is slightly later, but generally consistent with the zircon age within error bar (Mei et al., 2013 and references therein). In order to discuss the relationship between the formation of mineral deposits and granites, gathering more information on the mineralization background and tectonic setting, we can use further study on the age of mineral deposit through different method to get deeper insights.

In this study we carried out Ar-Ar geochronology study on the K-feldspar from ore-bearing quartz vein in Xishan deposits, the samples are analyzed in the laboratory of CNNC Beijing research institute of uranium geology, on an Argus VI static vacuum noble gas spectrometer with furnace by step heating. The plateau age shows 77.6±0.46 Ma with the MSWD value of 2.42, and both the isochron age and inverse isochron age show ~76 Ma, with the initial $^{40}Ar/^{36}Ar$ ratios slightly higher than 310.

3 Discussion

The new Ar-Ar dating results are notably close with the previous K-Ar age of 76Ma, and obviously younger than the other ages reported. This age may document another thermal event later than the mineralization, during which the temperature was high enough to restart the K-Ar stystem but would not change the isotopic composition of zircons.

Another fact that should be noticed is that, the Ar-Ar apparent age of K-feldspar samples usually show its unique diagram, exhibiting gradually increasing steps, which is the result of argon diffusion caused by the tectonic thermal events (Mark et al., 2008; Chen et al., 2011; Wang et al., 2014). In this study, however, the age result comes with an almost perfect plateau where no

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evidently waves can be observed, which may indicate a rapid cooling after the hydrothermal event so that the K-feldspar has been able to preserve the radiogenetic argon as biotite does. Combined with the consistence with published K-Ar age, this result implies that K-Ar method is still a useful tool to produce accurate ages (though less precise than Ar-Ar method) when the sample is suitable.

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