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Re-Os Age of Molybdenite from the Checangyu Molybdenum Deposit in the Xiaoqinling District and Its Implication for Metallogeny

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1 Introduction

The Xiaoqinling district, located in the southern margin of the North China Craton, is the second largest gold producing area in China. Tens of quartz vein type gold deposits have been demonstrated in this area. Several Mo deposits have also been discovered in recent years, including the Dahu and Majiawa Au-Mo deposits and Quanjiayu and Checangyu Mo deposits. Molybdenite Re-Os dating has provided useful constraints on the ages of the Dahu, Majiawa and Quanjiayu deposits (Li et al., 2007; Li et al., 2008; Wang et al., 2010). The Dahu and Majiawa Au-Mo deposits which controlled by east-west brittle-ductile faults within the Taihua Group rocks have molybdenite Re-Os model ages of 215~256 Ma and 233~268 Ma, respectively (Li et al., 2007; Li et al., 2008; Wang et al., 2010). Molybdenite Re-Os dating of the Checangyu Mo deposit which formed at the contact zone between the Cretaceous Wenyu pluton and the Taihua Group rocks yielded model ages of 130~131 Ma (Li et al., 2007). In this study, we present molybdenite Re-Os dating results of the Checangyu Mo deposit to better understand the timing of Au-Mo mineralization in the Xiaoqinling district.

2 Characteristics of the Deposit

The Checangyu Mo deposit is located at the contact zone between the Yanshanian Niangniangshan granitoid and the Neoarchean -Paleoproterozoic Taihua group basement rocks. It is a small scale quartz vein type Mo deposit. Quartz veins, commonly hosted in two groups of X joint, contain molybdenite flakes, pyrite, potassium feldspar, chalcopyrite, magnetite, and hematite. Molybdenite also occurs as coarse-grained and radial aggregates in altered granite and massive accumulations in fractures of the Taihua basement rocks. Wall rock alteration includes silicification, epidotization, potassic alteration and pyritization. The analyzed sample XQL-106 was collected from the Mo-bearing quartz veins.

3 Results and Discussions

Re-Os dating of molybdenite was finished at National Research Center of Geoanalysis using TJA X-series ICP-MS. Chemical procedure and analytical methods follow Du et al. (1994).

The Re-Os model ages are calculated with the equation $t=\ln(1+187Os/187Re)/\lambda$, where λ is the decay constant of 187Re, 1.666×10-11/a. The sample XQL-106 was dated twice, yielding Re-Os model ages of 133.8±4.3 Ma and 132.7±2.2 Ma, indistinguishable from that of the Quanjiayu Mo deposit in the contact zone between the Wenyu granite and the Taihua basement rocks (Li et al., 2007). Therefore, there are at least two stages of Mo mineralization in the Xiaoqinling district. One occurred during Indosinian represented by Dahu and Majiawa Au-Mo deposits which controlled by east-west brittle-ductile faults within the Taihua Group rocks. The other occurred during Yanshanian represented by Checangyu and Quanjiayu Mo deposits which formed at the contact zone between the Cretaceous plutons and the Taihua Group rocks.

It is suggested that the Re contents in molybdenite can potentially be used as a petrographic indicator for molybdenite and associated deposits (Mao et al., 1999). The Re contents of molybdenite in the Checangyu deposit are 83 and 86 ppm, which indicate that the ore forming materials were likely derived from I type granite (Mao et

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al., 1999). The Checangyu Mo deposit occurs at the contact zone between the Taihua Group rocks and the Niangniangshan pluton, which has been proven to be I type and has the same age with the Mo mineralization (Zhao et al., 2012). Therefore, the Checangyu Mo deposit should be related to the Niangniangshan pluton. The intrusion of the pluton provides heat, ore-forming material and fluid to form the Mo deposit.

4 Conclusions

The mineralization of the Checangyu Mo deposit was taken place at about 133 Ma and genetically related with the intrusion of the Niangniangshan granite. The Xiaoqinling district contains two distinct stages of Mo mineralization, i.e. Indosinian Au-Mo mineralization and Yanshanian Mo mineralization.

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