YUAN Yuan, ZHANG Da, FENG Haibin, DI Yongjun, NI Jianhui and WEI Mu, 2014. The Metallogenic Chronology of the Shierpai Molybdenum Polymetallic Deposit in Wuping, Fujian and Its Geological Significance. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1027-1028.

The Metallogenic Chronology of the Shierpai Molybdenum Polymetallic Deposit in Wuping, Fujian and Its Geological Significance

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The Shierpai Molybdenum polymetallic deposit in southwestern Fujian is a newly discovered medium-sized deposit. The deposit is located along the southern margin of the Southwestern Fujian Depression belt, a late paleozoic polymetallogenic belt, at an intersection between the east west striking Nan ling metallogenic belt and north east striking Yongmei depression polymetallic metallogenic belt, at the southwestern side of Shanghang-Yunxiao belt. The Shanghang-Yunxiao fault structural zone is an important host of gold, copper, lead, zinc, silver, molybdenum and other metals, it clearly controls the magmatism of Yanshanian period. The Zijinshan Copper mine, Yueyang silver mine, Shankou molybdenum mine, Zhongliao copper mine, Zhongteng copper mines are distributed around this zone, the area has excellent potential for further mineralization. In recent years, there has been significant research progress about the fault zone, rock body and isotope geochemistry of the deposit, but the research about Late Jurassic-Early Cretaceous magmatism and other aspects of the mineralization is still relatively weak. This paper studies the zircon U-Pb geochronology of rock body and Re-Os mineralization age of molybdenite from the Shierpai molybdenum polymetallic deposit, it reveals the genetic relationship between granitic intrusions and deposits and have further discussion about the relationship between the magmatism under Late Mesozoic Jurassic Late- Early Cretaceous tectonic background and metallogenic of polymetallic deposit.

1 Geological Features of Ore Deposit

The main ore body of Shierpai molybdenum polymetallic deposit is hosted in the contact zone between metamorphic rock from Louzibei group in Early Sinian epoch and middle-fine grained biotitic granite rock body. The biotitic granite containing high K calc-alkaline, metaluminous has close relationship with mineralization. The main structures of mine are NE and NW trending faults. Ore minerals are mainly molybdenite, with minor galena, sphalerite, chalcopyrite, pyrite, pyrrhotite associated locally etc. Gangue minerals are quartz, feldspar, chlorite, sericite, carbonate minerals etc. The ore body is mostly distributed along NE strike, NNW trending veins, stockwork and lenticular outputting. The deposit is considered to be a high-middle hydrothermal deposit and stages of mineralization divided into early molybdenite mineralization stage, metal sulfide stage and late molybdenite mineralization stage (Fig.1).

2 The Geochronology of Molybdenite Re-Os and Porphyritic Granite Zircon U-Pb

According to the correlation between ore-bearing biotitic granite and molybdenite, we choose biotitic granite and molybdenite from ZK803, ZK001 to carry out Re-Os and LA-ICP-MS zircon U-Pb isotopic dating research. Testing results show that the biotitic granite zircon age is 143.47 ± 0.42Ma which belongs to Early Cretaceous crystalline digenetic. Four samples of molybdenite Re-Os isotope model ages are (142.2 ± 2.1.) - (145.0 ± 2.7) Ma, a weighted average age of 143.9 ± 2.1 Ma, thus the forming age of Shierpai molybdenum polymetallic deposit is early Cretaceous too. The petrogenic age of biotitic granite and the metallogenic age of molybdenite are very close which reveals that the intrusion of high K calc-alkaline granite magmatism of Early Cretaceous relates to the forming of Shierpai molybdenum polymetallic deposit.

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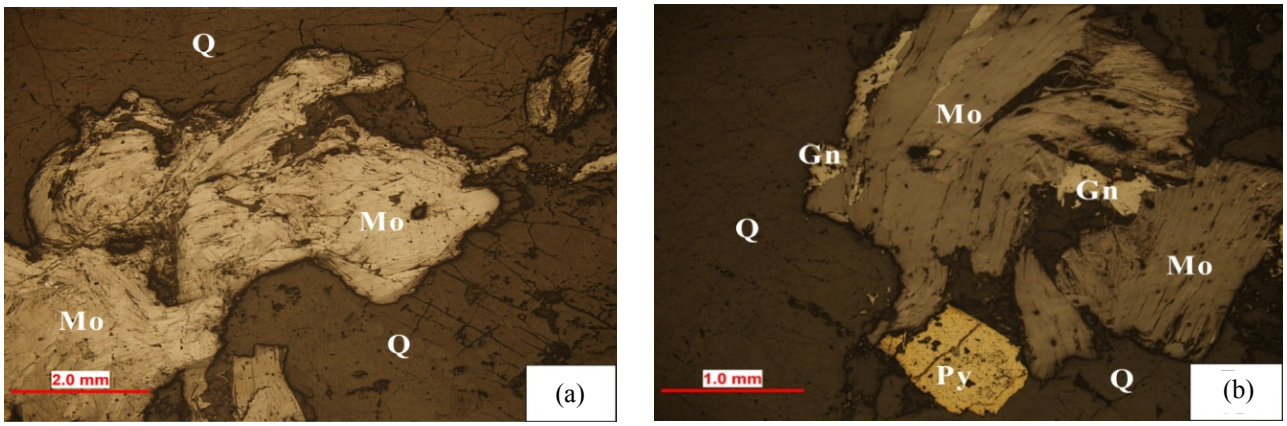

Fig.1. Early molybdenite (a) and Late molybdenite is closely associated with pyrite, galena and pyrite microscopic photos(b) from Shierpai molybdenum polymetallic deposit.

3 The Geochronology Geological Significance of Shierpai Molybdenum Polymetallic Deposit

In recent years, isotopic geochronology on whole rock and ore along the Shanghang-Yunxiao northwestward fault structural zone made significant progress about mineralization ages focusing on the Middle Jurassic and Early Cretaceous (Luo et al. 2009; Zhao et al., 2007, 2008). There are no much publications on the age of Late Jurassic - Early Cretaceous mineralization. The diabase dikes zircon U-Pb isotopic age of Makeng mining in southwestern Fujian depression and the molybdenite Re-Os isotopic age of Zhangping Beikengchang primary molybdenum mine polymetallic deposits are respectively 141.33±0.96 Ma (Wang. et al. unpublished) and 139 Ma-143 Ma (Zhang. et al. 2010) which suggest that this period corresponds to mineralization triggered by major magmatic event in southwestern Fujian due to subduction under the Pacific plate. Previously, the obtained mineralization age of Shierpai molybdenum polymetallic deposit was around 149.7 Ma-152.8 Ma (Wang. et al., 2013). Our study on isotopic geochronology of the biotitic granite and molybdenite reveals a biotitic granite zircon age of 143.47 ± 0.42Ma and molybdenite Re-Os isotopic weighted age of 143.9 ± 2.1 Ma, two ages that are consistent with each other. The implication of these ages is that this mineralization event and magmatic event are coeval, indicating that they may be cogenetic. Combining isotopic geochronology characteristics of the Late Jurassic, Late-Early Cretaceous Nanling region and Southwestern Fujian we deduced that tectonic metallogenic belt of Shanghang-Yunxiao is related to an intermediate-acid magmatism and corresponding mineralization in the Late Jurassic - Early Cretaceous period and the period of mineralization may be closely associated with the period of the Pacific plate subduction environment.

Acknowledgements

Project is funded by the Geological Survey Project (Nos. 12120114028701, 12120113089600, 1212011085472), The fieldwork based on this study was highly supported and helped by chief engineer Luo jinchang,engineer Wei mu from eighth geological brigade of Fujian Geological Prospecting Burea.Isotopic tests in this essay were discreetly done by National Research Centre of Geoanalysis and Tianjin Geological Survey Center Laboratory.Zhang xu,Zhang linkuo et al from China University of Geosciences helped with the sampling. Here to thank all the people above for their support and work.

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