LI Lamei, XIE Yuling, GUO Xiang, Sebastien Meffre, CHANG Zhaoshan, ZHANG Jian, YAO Yu, LIU Baoshun and WANG Aiguo, 2014. Chronology, Petrochemistry of Fine Grained Granite and their Implication to Mo-Cu Mineralization in Xichong Mo Deposit, Anhui Province, China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 556-558.

Chronology, Petrochemistry of Fine Grained Granite and their Implication to Mo-Cu Mineralization in Xichong Mo Deposit, Anhui Province, China

LI Lamei[1], XIE Yuling[1], GUO Xiang[1], Sebastien Meffre[2], CHANG Zhaoshan[3], ZHANG Jian[1], YAO Yu[1], LIU Baoshun[1] and WANG Aiguo[4]

1 *School of Civil and Environmental Engineering,University of Science and Technology Beijing,Beijing 100083,China*
2 *CODES ARC Centre of Excellence in Ore Deposits,University of Tasmania, Hobart TAS7001, Australia*
3 *Economic Geology Research Center (EGRU),James Cook University,Townsville, QLD 4811,Australia*
4 *Nanjing Institute of Geology and Mineral Resource, Chinese Academy of Geoscience, Nanjing 210016, China*

1 Introduction

Xichong Mo deposit is located in Yuexi county of Anhui province, China, which is in the east part of Tongbai - Dabie metallogenic belt. A series of giant and large porphyry Mo deposits have been reported in this belt including Shapinggou, Qian'e'chong, Tangjiaping Yaochong and Xichong etc. (Fig. 1), as well as some Au, Pb-Zn deposits. The geology, geochronology and geochemistry of key porphyry Mo deposits in this belts have been reported by Yang (2009), Meng et al. (2012), Zhang et al. (2011), Zhang et al. (2012), Chen et al. (2013), Li et al. (2011), Huang et al. (2011), Gao et al. (2014) and Wang et al. (2014). Most of these researchs is for Shapinggou, Qian'e'chong, Tangjiaping and Yaochong, no much for Xichong deposit.

Based on field observation, petrographic, ore-microscopic, SEM/EDS, XRD results together with chronology and petrochemical results of fine grained granite (FGG), this paper discusses the alteration, minerlization and the genetic link between FGG and Mo-Cu mineralization in Xichong deposit. The results show that Yanshanian FGG formed at the starting of regional extentional and is closely related to Mo - Cu mineralization. The potassic-silification represents the early alteration and followed by sericite - quartz alteration, propylitization and argillation. The Mo-Cu mineralization is closely related to propylitization. Late stage Cu mineralization is related to argillation.

2 Geology

Xichong Mo deposit is located in Dabie ultra-high pressure metamorphic terrane of east Qinling-Dabie orogenic belt (QDOB) (Fig 1). QDOB formed during the collision between Yangtze and North China craton and underwent complex tectonic evolution including oceanic crust subduction, arc magmatism, arc-continental collision and continent-continent collision（Wu et al., 2013）.

The most outcrops in the deposit is Yanshanian quartz monzonite (QM). FGG occurs as orientated stocks, blocky dikes which intrude into the QM with NE and NW trend. Bimodel dikes intruded into QM and occurs as the latest intrusive rock trending in NW, NE and EW. Bimodel dikes shows regular tabular shapes and comprise of quartz syenite porphyry and lamprophyre

The Mo mineralization occurs dominantly as disseminated and stock works in QM and FGG, with minor vein style in QM. The Cu mineralization occurs together with Mo as stock work or vein style in QM. Cu mineralization is also found in FGG as disseminated or stock work that related to late clay alteration.

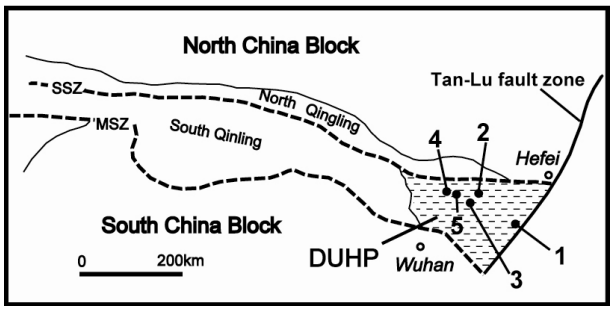

Fig.1. Tectonic setting of Xichong deposit (based on Meng and Zhang, 1999)
SSZ - Shangdan suite zone; MSZ - Mianlue suite zone; DUHP - Dabie ultra-high pressure metamorphic terrane; 1 - Xichong; 2 - Shapinggou; 3 - Tangjiaping; 4 - Qian'echong; 5 - Yaochong

* Corresponding author. E-mail: lilamei-2004@163.com

The alteration is well developed in the district including silification, K-silification, seritization, propylitization and argillization. Based on the vein crosscutting relationship, petrographic and ore microscopic results, five ore-forming stage can be recognized including K-feldspar – quartz - magmatite stage (I), sericite - quartz stage (II), epidote - quartz stage (III), calcite - chlorite stage and clay - quartz stage (V). Stage II and stage V is dominated ore - forming stage. The dominated ore minerals from stage II are molybdenite and chalcopyrite, whereas the dominated ore minerals from stage 5 are chalcopyrite, bornite and chalcocite. No Cu, Mo mineralization have been confirmed in bimodal dikes.

3 Chronolgy and Petrochemistry of FGG

Zircon U-Pb analysis was conducted at CODES (Arc Center of excellent in Ore deposit) of University of Tasmania, Australia. The results (Fig.2) give a U-Pb isochron age of 130.8±1.1Ma. The U-Pb age for early QM and late bimodal dikes also give Yanshanian chronological results (Xie et al., unpublished data).

The petrochemical results show high SiO_2 (74.55~75.61%), high alkaline (K_2O+Na_2O, 7.94~8.66% and K_2O/Na_2O of 1.09~1.60 indicating a subalkaline, high K calc-alkalic and shift to shoshonitic rock. A/CNK and A/NK diagram show the transition from meta-aluminous to peraluminous. K_2O and Na_2O results implies A type granite affinity .

The total REE of FGG is from 25.910×10^{-6}~61.714×10^{-6}, with average of 41.48×10^{-6}. The ∑LREE/∑HREE is from 16.48 to 22.86. The primitive mantle normalized REE distribution pattern show LREE enriched "W" shape implying varied degree of fractionation inner LREE and HREE. Trace element results show Rb, Th, U, K, Hf and Pb enriched and P, Ti, Nb, Ta, Sr and Ba depleted

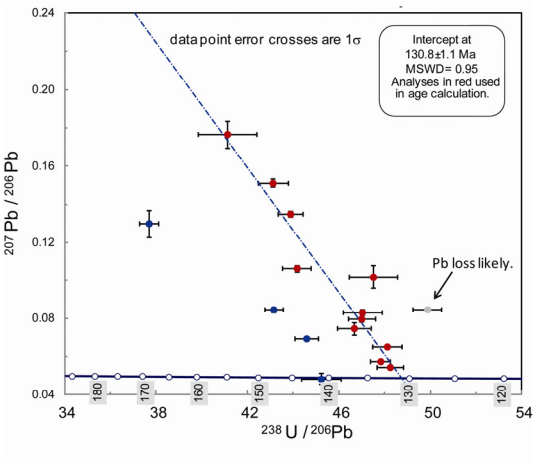

Fig. 2. Fine-grained granite U-Pb isochron diagram

character.

4 Discussion and Conclusion

Based on field observation, petrologic, petrographic and zircon U-Pb dating results, the intrusive rocks in Xichong Mo deposit, from early to late, are QM, FGG (130.8±1.1Ma) and bimodel dikes which are all Yanshanian magmatic products.

Petrochemical results indicate high Mo (17.5-89.7 ppm, with average of 50.27ppm) in FGG. The distribution of confirmed Cu-Mo mineralization, alteration and Cu-Mo geochemical abnormity is spatially related to FGG indicating a genetic link between FGG and Cu-Mo minralization. The U-Pb age for FGG is almost coeval to bimodal dikes, and implies the early stage of regional extensional setting.

The petrochemical results of FGG show affinity to post collision A type granite in Dabie orogenic belt (Wang et al., 2000) and in Lower Yangtze River metallogenic belt (Fan et al., 2008). The FGG share many similar geochemical characteristics with Mo host granite porphyry or syenite in Tangjiaping and Shapinggou respectively (Yang, 2009; Wei et al., 2010; Zhang et al., 2011), implying a similar tectonic setting and magma source.

Acknowledgments

This study was financially supported by the Ministry of Land and Resource of People's Republic of China (No. 201011011 and 1212011220515).

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