SHAO Yongjun, QUAN Wei, ZHENG Liming, YE Zhou, LUO Meiyan, GUO Biying and ZHAO Zhiqiang, 2014. Zircon U-Pb Dating of Granite Porphyry of Sanmianjing Pb-Zn-Ag Deposit in Inner Mongolia, and Its Constrains on Mineralization Age. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1003-1004.

Zircon U-Pb Dating of Granite Porphyry of Sanmianjing Pb-Zn-Ag Deposit in Inner Mongolia, and Its Constrains on Mineralization Age

SHAO Yongjun[1], QUAN Wei[1], ZHENG Liming[2], YE Zhou[1], LUO Meiyan[1], GUO Biying[1] and ZHAO Zhiqiang[1]

1 Key Laboratory of Metallogenic Prediction of Nonferrous Metals, Ministry of Education, Central South University, Changsha 410083, China
2 Development and Reform Bureau of Zhengxiangbaiqi, Xilin Gol League, Inner Mongolia 011000, China

1 Metallogenic Background

The geotectonic position of Inner Mongolia Sanmianjing Pb-Zn-Ag deposit which is belongs to part of edge of the Inner Mongolia plateau southeast arc is located in Yinshan east-west complex tectonic belt and Great Khingan uplift fold belt uplift area. The main outdoor layer of this diggings is mainly the Sanmianjing group of lower Permian system whose lithology are mainly tuff, a ribbon of silicified limestone, crystal limestone, biological reef limestone and a small amount of sandstone, and the Pliocene series of tertiary and quaternary whose lithology are mainly shale containing calcium tuberculosis and clay rock. The structures of this digging are mainly north-west trending faults and north east trending faults. The Northwest trending faults are located in the granite porphyry. And their strike is 300° or so, their dip is NE30°or so and their dip angle is nearly erect (78±5°). They belong to shear extensional fault. Their width is between 1.5 to 3 m. Park of them present little undulatory. The northwest trending faults are the main ore-controlling structure and ore-hosting structure of this digging. The northeast trending faults are posterior ore-forming structure. Magmatic activities are strongly in this diggings, the Yanshanian magmatic rocks which are mainly consist of granite porphyry and like a cloud porphyritic granite porphyritic-like biotite granite are the main magmatic rocks, ore-hosting rocks are mainly granite porphyry.

2 Characteristics of Rock Mass

The granite porphyry which distributes in western and central of the mining area is closely related to the metallogenesis and is the main host rock. The phenocrysts are mainly composed of quartz and feldspar and small part of plagioclase and biotite. The content is between 40% ~55% and some of them are metasomatized by quartz and carbonate minerals. The matrixes are fine-particle structure, composed primarily of quartz, feldspar and a small amount biotite. The content is between 45%~60% and granularity is between 0.05~0.1mm. Major elements analyses show that the content of SiO_2 is 68.86%~71.78%, with an average of 70.51%. The content of (Na_2O+K_2O) is 9.34%~10.09%, with an average of 9.59%. The σ is 3.03~3.94, with an average of 3.36, and the A/CKN is 0.97~1.00, average 0.99, less than 1.1 show that the rock belongs to alkaline and aluminum rock. Trace elements analyses show that Rb, U, Zr, Th, Hf are enriched and Sr, Ba, Nb, Ta, P, Ti are deficit elements in the rock. The Eu negative anomaly is clear (δEu=0.36~0.68) and the ΣREE

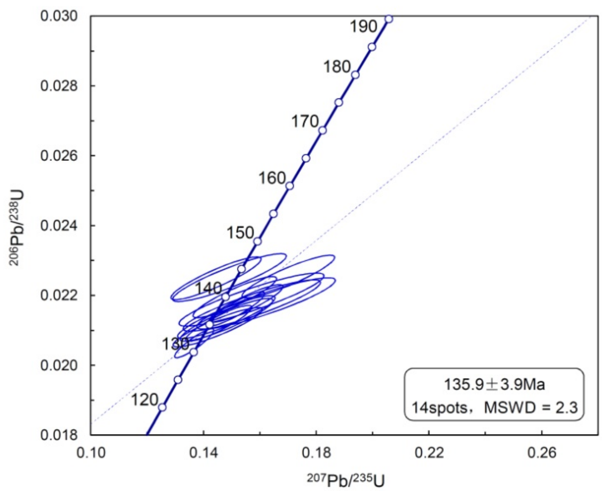

Fig. 1. Concordia plot zircon U-Pb ages of granite porphyry in Sanmianjing deposit

* Corresponding author. E-mail: 706707484@qq.com

is high which ranges from 335.4×10^{-6} to 379.80×10^{-6}. The LREE is relative enrichment and HREE is apparent loss. REE distribution pattern is characterized by right-type.

3 Sampling and Analytical Method

The sample for zircons U-Pb dating test is from the part between 185.0m to 187.5m in the drill ZK003, whose lithology is granite porphyry. The broken and zircon pick of the sample were did by Regional Geological Survey Institute in Langfang, Hebei Province. Analysis of the work was completed at the State Key Laboratory of Continental Dynamics in Northwest University, China. ICP-MS for testing is Agilent7500a made by Agilent Company in the United States, and the laser ablation system is GeoLas200 M made by MicroLas Company in Germany. The test mode is a single point of shell candle. The carrier gas of denudation material, the laser beam diameter, the frequency of testing, the background acquisition time and Signal acquisition time are helium, 30um, l0Hz, 30s and 40s, respectively. The U-Pb dating and the content of elements are checked by 91500 and NIST610, respectively.

4 Test Result and Analysis

The zircons of granite porphyry samples in ZK003 are mainly short column. Aspect ratio is about 1.0~2.5. Particle size is between 80 to 200μm. Zircons' oscillating band structure is clear, showing that zircons are magmatic zircons. The test results show that $^{206}Pb/^{238}U$ ages of 14 points range from 131.6 to 143.7Ma, the mainly data distribution in 134.5~140.0Ma. The test result is the same with LA-ICP-MS zircon U-Pb ages (134.6±1.1Ma ~ 144.9±1.3Ma) of rock mass in Zhengxiangbaiqi (Qin et al., 2012). In the U-Pb age harmonic figure (Fig.1), all analysis points distribute on the harmonic line or nearby. The $^{206}Pb/^{238}U$ weighted average age of 14 points is 135.9±3.9Ma (1σ, MSWD=2.3) which represents the crystallization age of granite porphyry in Sanmianjing Pb-Zn-Ag deposit.

Ore bodies in this area are located in the NW trending fault zone inside rock mass. Ore-forming is obviously later than diagenesis. The age of rock mass crystallization is the upper limit of ore body formation. The rare earth element distribution curve of mineral (galena) and rock mass is almost the same. And they all have obvious Eu negative anomaly. The contents of metallogenic elements Pb, Zn, Ag within the rock mass are respectively 48.8×10^{-6}, 145.6×10^{-6}, 0.5×10^{-6}, which are higher than Vickers values (15×10^{-6}, 83×10^{-6}, 0.07×10^{-6}). And that suggests that the deep primitive magma forming granite porphyry has the ability to provide ore-forming materials, rock mass is closely associated with the mineralization and rock mass and ore are probably derived from the same deep magma chamber. After diagenesis, the tectonic movement leads to the formation of NW trending fault in the rock mass, the invasion of the magma in the deep magma chamber, and the formation of medium-acidic dyke and the hydrothermal vein type ore bodies filling along the NW trending fracture.

5 Conclusion

The granite porphyry came out in late Yanshanian. The movement of late tectonic leads to activity again of the magma in deep magma chamber, which provided the ore-forming materials and heat for mineralization. So the rock mass and the ore body are related with the magmatic activity of the deep magma chamber at different stages.

References

Qin Ya, Liang Yihong, Xing Jilin, et al. 2012. LA-ICP-MS Dating, Geochemical Characteristics and Geological Significance of Early Cretaceous A-Type Granite in Zhengxiangbaiqi Area, Inner Mongolia [J]. Journal of Jilin University (Earth Science Edition), 42(3): 254-165.