Zircon U-Pb Age, Geochemistry and Geological Significance of Granite Porphyry from Xiagalaiaoyi Pb-Zn Deposit in the Great Xing’an Range

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Abstract: The Great Xing’an Range is an important part of the most eastern part of the central Asian orogenic belt. The geochronology data in recent years shows that the main ages of the formation for intrusions there is Mesozoic (Tang et al., 2016). Mineralization mainly occurred in the Late Mesozoic, reached its peak in the Early Cretaceous, and is closely related to the Mesozoic magmatic hydrothermal activity. Shu et al. (2016) believe that the tectonic setting and mineralization of the early and middle Jurassic igneous rocks in the northern part of the Great Xing’an Range are related to the subduction of the ancient Pacific plate in the early Jurassic, while Chen et al. (2017) believe it is related to the subduction of the Mongol-Okhotsk oceanic plate. The Xiagalaiaoyi Pb-Zn deposit is located on the metallicogenic belt of Cu, Pb, Zn, Ag, Al and U in the Mesothermal episode of the Quasi-aluminous A-type granites. The samples’ Nb/Ta is 13.14-13.25, which is between the global lower crust (8.3) and the depletions mantle (17.7), La/Nb is 3.01–3.07(>1), indicating that mantle-derived material was added during the formation of granite porphyry. K, Rb and Th were enriched in the samples, while Nb, Ta and Ti were deficient, manifesting that crustal miscibility occurred in the process of magma rising. In the Rb-(Yb+Ta) diagram (Fig. 1), the samples fell into the post-collision tectonic environment. The samples’ differentiation index, DI is 93.48–93.96, indicating that it has the characteristics of extensional granite and reflecting the extensional tectonic background of the magmatic evolution during the middle Jurassic in the study area, that is, the granite porphyry associated with mineralization formed from the extensional environment formed after the closure of the Mongol-Okohtsk Ocean in the middle Jurassic. The genesis may be related to the partial melting of the lower crust caused by mantle magma underplating.

Key words: A-type granite, granite porphyry, Middle Jurassic, extensional environment, Xiagalaiaoyi, Great Xing’an Range

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Fig. 1. (a) Chondrite-normalized REE patterns; (b) Primitive mantle-normalized trace element spidergrams; (Normalization values are from Sun and McDonough (1989)). (c) U-Pb harmonic diagram, distribution of ages diagram and CL images; (d) Rb-(Yb+Ta) discriminant diagram (Pearce, 1996).

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