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Zircon and apatite fission track study on the mineralazation of Nanliang gold deposit, eastern Hebei, China

WANMING YUAN[1], JUN DENG[1], JINQUAN DONG[2], ZENGKUAN BAO[2]

[1] State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing, 100083, China (ywm010@yahoo.com)

[2] Laboratory of Nuclear analysis techniques, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, 100039, China

Xiayingfang gold ore district, Hebei province, China, occurs in Xinglong-Kuancheng arcuate fold area of Yanshan platform fold belt in eastern Yinshan-Yanshan EW tectonic belt. A granite-porphyry intrusion, the principal part of magma activity in this area, is close related to the gold mineralizing process. This paper aims at studying the hydrothermal metallogenetic epoch and thermal history of Xiayingfang gold deposit, based on zircon and apatite fission track analyses for different alteration zones.

The zircon and apatite ages of six samples from ore and altered rocks range from 154 Ma to 120 Ma and from 114 Ma to 103 Ma respectively, indicating a about 22-50 Ma metallogenetic duration, and the metallogenetic time falls into early Yansan epoch. The age data and quantitative AFT modelling show that there are two stages of gold mineralization, in which the first stage is of higher temperature and rapider cooling rate than the second stage and the time and temperature of the turning point between them is about 120 Ma and 100 ℃. The first stage of mineralization resulted from intrusion of a granite-porphyry body and took place in about 150 Ma, and second stage of the mineralization was related to both rhyolite-porphyry and magma cryptoexplosive breccia and occurred in about 135 Ma. Combined with the minerogenetic temperature of 370～290℃, 230～170℃ and 150～80℃ in vanward-, main- and late-mineralization period respectively, the ZFT and AFT ages correspond to the main- and late-mineralization period separately. Since the samples from different places are heated in different degree by the metallogenetic hydrothermal solution, the less the distance from the thermal source and the long the heating time is, the lower the measured fission track age. It is demonstrated that the quartz-sericitization alteration is earlier and lasts longer than the potassic alteration. Therefore, we consider fission track analysis of the minerals is useful to researching the metallogenetic epoch and thermal evolution history of hydrothermal deposits.

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