

Trace Elemental Compositions of Garnet in the Guilinzheng-Huangshanling Deposit, Jiangnan Transition Zone, China

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The Guilinzheng-Huangshanling skarn deposit is the largest W-Mo-Pb-Zn deposit in the Jiangnan transitional zone, which adjoins the south side of the Yangtze River metallogenic belt. Previous studies of this deposit focused on the associated granitic porphyries and indicated a zircon U-Pb age of 126.8 ± 1.4 Ma. We analyzed garnet from drill holes in the Guilinzheng-Huangshanling deposit using EPMA and LA-ICP-MS to determine compositional variations related to changes in fluid chemistry.

The Guilinzheng-Huangshanling skarn includes both endoskarn and exoskarn. Endoskarn is very minor. Exoskarn occurs on the contact with the Yanshanian granitic porphyries and is mainly developed in Ordovician limestone. Garnet color changes from red-brown in the endoskarn to light green in the exoskarn, corresponding to the change of mineralization from proximal W-Fe-Zn, through Zn-Pb, and to distal Pb-Cu-Ag mineralization. Major and trace element concentrations in garnets from the skarn reflect a diversity of local environment and evolving fluid chemistry. Based on the major element concentrations, the garnet can be divided into grossular-dominant and andradite-dominant. The endoskarn is grossular-dominant but also includes diopside. Exoskarn varies from grossular-dominant to andradite-dominant. The trace element contents of garnet vary regularly in space from endoskarn to exoskarn, and from core to rim in individual crystals. The HREE content of garnet in endoskarn increases from the core to the rim, with strong negative Eu anomaly. The REE pattern in the core is similar to that of Guilinzheng granitic porphyries. The exoskarn garnet shows reversal of the trend in endoskarn garnet, with \sum REE higher in the core than in the rim, and both core and rim show similar strong positive Eu anomalies and LREE-enrichment. Garnet from distal skarn shows enrichment in \sum REE, and the REE pattern of the core has a slightly positive Eu anomaly, but the rim has no Eu anomaly. The variations in garnet color and REE patterns formed in response to changes in temperature and fluid composition, reflecting interaction of fluids from both magmatic and meteoric sources.