

## Fe isotope compositions of pyrite in the Xiaoqinling and Dongping vein gold deposits, China\*

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Fe isotope data are useful in studying ore-forming process, including magma-fluid exsolution, evolution, and source of ore-materials, but rare reports on vein gold deposits were seen as yet. Zhu and Jiang (2018) recently demonstrate that  $\delta^{56}\text{Fe}$  of pyrite show a response to pyrite precipitation during fluid/rock reaction in K-feldspar alteration of granite.

Several pyrite samples of vein gold deposits from the Xiaoqinling (XQL) in west NCC (North China Craton) and the Dongping (DP) in north NCC were selected to analyze Fe isotope compositions. The results show that the  $\delta^{56}\text{Fe}$  values of pyrite in the XQL have a relatively narrow range varying from -0.026 to 0.409 ‰ (7 samples) for the Wenyu-Dongchuang gold deposit, and from 0.298 to 0.558 ‰ (3 samples) for the Dongtongyu deposit. The  $\delta^{56}\text{Fe}$  values of pyrite in DP of North Hebei are relatively lower than the Xiaoqinling, that is, from -0.010 to 0.255 ‰ (4 samples).

The  $\delta^{56}\text{Fe}$  values of pyrite from the Xiaoqinling are mostly positive, with an average of 0.262‰, and those from the Dongping have an average of 0.156‰. These results are somewhat different from the  $\delta^{56}\text{Fe}$  values of pyrite in the Jiaodong Peninsula of east NCC. The pyrite in disseminated ore (Jiaojia gold deposit, JJ) of Jiaodong has a heavier  $\delta^{56}\text{Fe}$  range from 0.01 to 0.64‰ (38 samples, average 0.539‰, Zhu and Jiang, 2018), and pyrite in quartz veins (Linglong deposit, LL) has a  $\delta^{56}\text{Fe}$  range from -0.78 to 0.79‰ (16 samples, average 0.259‰). It is inferred that K-feldspar alteration related gold deposits have heavier Fe isotope composition than quartz-vein gold deposits. Gold deposits in the XQL are typical quartz-vein type and have a lighter  $\delta^{56}\text{Fe}$ , so does in the DP deposit.

It is interesting that the  $\delta^{34}\text{S}$  of pyrite is somehow related with  $\delta^{56}\text{Fe}$ . The  $\delta^{34}\text{S}$  values of pyrite in the XQL show a lighter range varying from -7.13 to 7.10‰ (114 samples, Xu 1993), and those in the DP range from -13.03 to 0.5 (27 samples, Song and Zhao, 1996). However, the  $\delta^{34}\text{S}$  values of pyrite in the LL deposit of Jiaodong have an range from 3.64 to 8.64‰, and in the JJ deposit, from 8.7 to 12.6‰. The heavier the  $\delta^{34}\text{S}$  values, the heavier are the  $\delta^{56}\text{Fe}$  values. Hence, the data of  $\delta^{56}\text{Fe}$  are helpful in studying ore-forming process.

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