

A study on lead isotope compositions of Dajiangping pyrite deposit of Guangdong, South China

K. LI, K. HU, AND S. M. SONG

Department of Earth Sciences, Nanjing University, Nanjing
210093, P. R. China (kaihu@nju.edu.cn)

The Dajiangping pyrite deposit lies in the north-eastern part of the Yunkai ridge, south China. It is a unique ultra-large pyrite deposit in the south of Sinian (period) layer. The ore genesis model for the Dajiangping deposit has long been in dispute, and the major debate focuses on whether the ore bodies formed during hydrothermal sedimentation reform, by a vapour-liquid superimposition event, or whether formation was the product of hydrothermal sedimentation. In this paper, we report lead isotope data for the Dajiangping ore deposit, and discuss the origin and evolution of the hydrothermal fluid. Lead isotope of 11 samples were measured from orebody III (banded pyrite), orebody IV (massive pyrite) and wall rocks. The Pb isotope compositions from the ore and wall rocks show that, $^{206}\text{Pb}/^{204}\text{Pb}$ values range from 18.075 to 18.292, $^{207}\text{Pb}/^{204}\text{Pb}$ values range from 15.654 to 15.737, and $^{208}\text{Pb}/^{204}\text{Pb}$ values range from 38.401 to 38.781. These ratios indicate that orebody III is very similar to the wall rock, whereas orebody IV has lower Pb/Pb ratios than wall rock. The data also incorporate Pb isotope data of Yunkai ridge area magmatic rock and basement migmatite in Pre-Sinian period, as well as other Pb isotope data from pyrites. The lead isotope data from the pyrites differs from the lead isotope data from the magmatic rocks. This indicates that the ore deposit must not be the product of igneous magmatism. It also shows that the lead isotope compositions of minerals and wall rocks are mainly consistent. Although the lead isotope compositions of the two ore types partially overlap, the massive orebody has lower Pb isotopic values than the banded orebody. It is possible that the lead from mantle fluid had been added to the orebody. Therefore, the Pb isotope characteristics of the Dajiangping pyrite deposit strengthen our conclusion that the orebody IV was formed by late mantle fluid, which migrated along a thrust fault and altered the original shape of the orebody. The Lead isotope data support the interpretation that mantle fluid intruded into the entrapping Pre-Sinian basement migmatite, causing lower Pb isotope ratios in orebody IV. This work was financially supported by the Natural Science Foundation of China (No.40172035 and No.40221301).