SEG 2017 Conference

# The origin of different types of pyrite in gold-rich VMS deposits in the Bikou terrane, China

Zhichao Zhang*, Liqiang Yang, Xingzhong Ji, and Nan Li

China University of Geosciences, Beijing, Beijing, China, *e-mail, ZZC_CUGB@126.com

The Bikou terrane is located in the triangular intersection of the Qinling Orogen, Songpan-Ganze Orogen, and South China Block. It is mainly covered by Neoproterozoic metavolcanic rocks and turbidites, with a few outcrops of Neoarchean greenschist facies volcanic sedimentary units. Bimodal volcanic rocks in this area can be related to the genesis of VMS deposits, such as the Yangba Cu deposit that is a gold-rich VMS associated with basic volcanic rocks. In addition, Donggouba is a gold-rich Pb-Zn VMS deposit associated with intermediate-acidic volcanic rocks. Polymetallic sulfide minerals in these two deposits, such as pyrite, magnetite, chalcopyrite, hematite, sphalerite, gelena, and gold, formed by volcanic and hydrothermal metasomatic processes. Trace elements in vein pyrite and disseminated pyrite, which coexist with magnetite and chalcopyrite, were compared from the two deposits using in situ LA-ICP MS techniques. The results reveal that different types of pyrite are of different origin and have their own characteristic element contents, with particularly obvious variability in the Ni and Au concentrations as well as Co/Ni ratios. Pyrite with high Co/Ni ratios (28.5~288) and low Au concentrations (0.01~0.30) in Yangba deposit is consistent with derivation from a hydrothermal source. In addition, low Au concentrations in these pyrites may explain that the Au and the pyrite are coming from different source rocks in Yangba deposit area. High Cu concentrations (1.97~454) may reflect the Cu-rich mineral inclusions in the pyrite grains. In contrast, Pyrite with low Co/Ni ratios (0.01~1.57) and high Au concentrations (0.01~3.16) in the Donggouba deposit is in agreement with derivation from a syn-sedimentary and hydrothermal source. The Co/Ni ratios of vein pyrite are 0.06~0.60, which is in agreement with the sedimentary source. In addition, the Co/Ni ratios of disseminated pyrite are 0.01~1.57, which is in agreement with a hydrothermal metasomatic origin. High Au concentrations in these pyrites may reveal a genetic relationship between pyrite and gold in the Donggouba deposit. Furthermore, vein pyrite has high Ni concentrations (11.4~3428) whereas the disseminated pyrite is the opposite (5.23~53) in the Donggouba deposit. High Pb concentrations (0.11~2582) may reflect discrete PbS phases. Thus, the pyrite in the Yangba deposit is of hydrothermal origin, and the pyrite in the Donggouba deposit is of syn-sedimentary and hydrothermal origin.