Application of Stoichiometric Ratio of Sulfur and Iron to Metallogenic Prediction

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The shift of prospecting work from shallow surface to the deep proposes a new challenge for geochemical exploration, and searching for new index of geochemical exploration has become an effective way. The element S, a typical chalcophile and mineralizing agent, is indispensable for ore-forming materials of most non-ferrous metal deposits. In ore-forming processes, the element S combines with a variety of metal elements to form metal sulfides due to its chalcophile property. Therefore, we can use the synergistic relationship of S anomaly with Fe and other ore-forming elements to judge whether the mineralization stops and the mineralization possibility of the deep and peripheral areas.

This paper explores the application of stoichiometric ratio of S and Fe in to metallogenic prediction the Tongshan copper deposit of Heilongjiang Provinc, Northeast China. Samples are collected from drill hole ZK611, and the sampling interval is 5-8 m. Within every sampling interval, samples are collected by continuous picking of rock blocks, and 8-10 pieces of 20-30 g weight rock samples comprise an analytical sample with a total weight of 200-300 g. The results shows that, in the drillhole ZK611 with copper orebody occurrence, the influx of mineralizing agent element S averages 7, 160 g/t, 5, 469 g/t for ore-forming element Cu, and 8, 796 g/t for Fe. This corresponds essentially to stoichiometric ratios of element S with Cu and Fe in chalcopyrite. In contrast, below the copper orebodies, the Cu influx is 652 g/t, 5, 359 g/t for Fe, while the S influx reaches up to 18, 575 g/t, which are greatly in disagreement with their stoichiometric ratios. However, there are no other metal sulfide minerals observed with naked eyes except chalcopyrite and pyrite. Microscopic identification of petrographic polished sections shows that there is Pb-Zn mineralization in the drill hole ZK611 at depth of 494-581 m, and the mineralization is dominated by galena and sphalerite. And the galena and sphalerite display a fine granular texture, and can not be identified with naked eyes. It is thus inferred that, mineralization has not ended under copper orebodies, but has changed to Zn-Pb-polymetallic mineralization. The discovery of the polymetallic mineralization with an apparent thickness of 90 m indicates a new comprehensive evaluation of resources and prospecting direction, and the economic value should be further evaluated.