

## Geochemical characteristics of trace element distribution in ores and host rocks in the Ghuzayn Cu VMS deposit, Oman

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The Ghuzayn Cu-Fe massive sulfide ore deposit is one of the typical Cyprus-type deposits hosted in Oman ophiolite which providing a unique opportunity to study geochemical conditions of paleo-oceanic crust. Vertical distribution of Cu, Zn, Co and Ni in sheeted-dike complex, altered pillow basalts and massive sulfide ores were examined to clarify the chemical mobility in oceanic crust because of hydrothermal circulation and precipitation of sulfide minerals.

Ghuzayn massive sulfide deposit consists of three orebodies and their Cu sulfide ores are divided into massive ores of pyrite, chalcopyrite and minor sphalerite and stockwork ores with disseminated pyrite, chalcopyrite and quartz. Sulfide mineralogy of Ghuzayn deposit is relatively simple and dominated by pyrite with some chalcopyrite and only minor sphalerite. Major and trace elements concentrations of the ore reflect its mineralogy composition. Cu is relatively rich in ores in composition (Average: 2.5 wt% Cu) because of some chalcopyrite. However, Zn is relatively poor (Average: 190 ppm Zn) because of minor sphalerite. Co is rich (Average: 950 ppm Co) and Ni is poor (Average: 26 ppm Ni) in pyritic ores, because of high concentration of Co in pyrite up to 7.0 wt% with relatively low Ni content. More than 300 pyrite crystals from 25 polished sections are analyzed by an electron microprobe analyzer at Yamagata University. Cobalt is the most representative minor elements in pyrite crystals from the Ghuzayn massive Cu-Fe ore deposits. Copper grade of ores is strongly correlated to concentrations of cobalt in pyrite. As mentioned above, Cu and Co are relatively rich in ores in comparison with scarcity of Zn and Ni.

Whereas the massive sulfide ores, vertical distributions of Cu and Co in sheeted-dike complex and altered pillow basalts indicate the low concentrations (average: 38 ppm Cu, 32 ppm Co) and these of Zn and Ni in sheeted-dike complex indicate the low concentrations too (average: 61 ppm Zn, 44 ppm Ni). But relatively high concentration of Zn and Ni are detected in footwall altered basalts. The average contents of Zn and Ni are 170 ppm and 107 ppm. Average Zn/Cu ratio and Ni/Co ratio are 67 and 2.5 in altered pillow basalts. These footwall altered pillow basalt mainly consists of chlorite and its Zn and Ni content is up to 827 ppm (average: 344 ppm Zn) and 215 ppm (average: 11 ppm Ni).

Cu and Co are deposited as chalcopyrite and trace element in pyrite from hydrothermal solution. Among some circulating elements, preferential fixation of Zn and Ni to chlorite in altered rocks is responsible to the reason that these metals are not precipitated into massive ores.