IN SITU GEOCHEMICAL FEATURES OBTAINED BY PXRF AS A CONSTRAINT ON THE GENESIS OF BAIYINNUOER PB-ZN DEPOSIT, INNER MONGOLIA, CHINA

Z. Yuan[1], Q. Cheng[1,2], L. Yao[1]

[1] State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing, China (Z. Yuan: 280542690@qq.com)

[2] Department of Earth and Space Science and Engineering, York University, 4700 Keele Street, Ont. Canada M3J1P3 (Qiuming@yorku.ca)

Abstract

Two different types of mineral deposit models: stratiform sedimentary exhalative type and skarn type were previously proposed for the genesis of the Baiyinnuoer Pb-Zn deposit, Inner Mongolia, China. In order to further verify these models, in situ geochemical measurement was carried out by portable X-ray fluorescence analysis (pXRF) on outcrop profiles cutting crossing the three different dyke-wall rock interfaces which are closely associated with the main orebodies. The concentrations of 34 elements were analysed in 5×4-cm to 10x10cm grids in the quartz porphyry-marble (P-M), the felsic dyke-crystalline limestone (F-L) and in the granodiorite-marble (G-M) interface profiles, respectively. The results show that there was no ore elements migration and enrichment in the P-M interface profile. Significant amount of Ca migrated from limestone to felsic dyke while Si in the opposite direction, and no ore-forming elements enriched in the F-L interface. In the G-M interface profile, element Ca migrated from marble to granodiorite while Si in the opposite direction, K depleted strongly in altered granodiorite area, and ore-forming elements Zn, Pb, Fe, Mn, Cu, As, etc. enriched remarkably in the contact area, moreover showing a spatial zoning of Cu+As and Zn+Pb+Fe. The data were processed further by principal component analysis (PCA) for interpreting element associations involved in mineralization processes. Two elemental associations which are related to quartz porphyry and marble separately were obtained in the P-M interface profile. Element associations separately related to felsic dyke, limestone, potassic alteration, and pyritization were obtained in the F-L profile. The first four principal components obtained by PCA of the G-M profile were found to be related to the marble, diorite, and two stages of mineralization (Cu and Zn mineralization and Pb, Zn and Fe mineralization). The two stages of mineralization in the contact area consisting of hedenbergite skarn occur as earlier mineralization dominated by chalcopyrite-sphalerite and later mineralization by sphalerite-galena-pyrite. Taken as in situ geochemical evidences, the migration and enrichment of elements and the mineralization in contact skarn area are in favour of skarn type of the deposit, and ore-forming metals may originate from the granodiorite.