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Distribution of Trace Elements in the Sphalerite from the Stratiform Orebody of the Dongfengnanshan Cu Polymetallic Deposit in NE China and Genetic Significance

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Abstract: The Dongfengnanshan Cu polymetallic deposit in the Tianbaoshan ore district is located at the eastern part of the Xing'an-Mongolian orogenic belt, and has experienced the evolution and the transformation of the Paleo-Asian Ocean metallogenic domain and the Paleo-Pacific metallogenic domain (Xu et al., 2013; Yang et al., 2018). The main strata in the Tianbaoshan ore district are composed of the middle and lower Permian Miaoling Formation. The middle member is composed of carbonates and slates accompanied by interbedding andesitic tuffs and dacites. The lower member is made up of andesitic tuffaceous breccias and rhyolites. Late Hercynian granodiorite widely develops and the NE and NW-trending faults intersect in the west.The stratiform orebodies of the Dongfengnanshan Cu polymetallic deposit are hosted in the interbedding zone of volcanic rocks and carbonates of the Miaoling Formation, strike 330°–350°, dip SW at 30°–60°, have an average length of ~200m and an average width of ~15m. The primary metallic minerals include chalcopyrite, sphalerite, pyrite, pyrrhotite, galena with minor amounts of magnetite. Gangue minerals are quartz and calcite. Main ore structures and textures consist of massive structure, banded structure, vein structure, and euhedral to hypidiomorphic texture, crystalloblastic texture and replacement texture. Skarnization, chloritization, epidotization, silicification are the chief alteration types in the deposit.Trace elements' concentrations in sphalerite were conducted by in-situ laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP -MS)at the State Key Laboratory of Ore Deposit Geochemistry, IGCAS. The sphalerite from the stratiform orebody in the Dongfengnanshan deposit is characterized by the following features: (1) Fe concentration exceeds 10 wt% (mean 12.3 wt%) higher than other deposit types; (2) Mn is enriched in sphalerite (mean 1800μg/g) higher than epithermal and MVT-type deposits, and lower than skarns; (3) The mean In occurs with the content of 496μg/g; (4) Cd concentration (mean 5201μg/g) is lower than epithermal and MVT-type deposits and all samples contain minor quantities of Ga and Ge; (5) As, Rb, Sr, Mo, W, Pt, Au are always <1 μg/g in sphalerite; (6) Cu, Pb, Bi have a wide range of concentrations. In general, sphalerite from the Dongfengnanshan deposit is enriched in Fe, Mn, In, Co and is depleted of Cd, Ga, and Ge. In/Ga ratio (mean2056), In/Geratio(mean167), Zn/Cd ratio (mean133) correspondto the features of medium-temperature deposits. The binary diagrams In-Sn, Cd/Fe-In/Fe, Cu+Ag-In+Sn show that the sphalerite from the Dongfengnanshan deposit is consistent with that from some VMS deposits (e.g. Laochang, Dabaoshan, Ye et al., 2011), distinctly different from skarns, MVT-type deposits, epithermal deposits (e.g. Baia de Aries, Cook et al., 2009) or other deposit types. Elevated Co concentration in sphalerite may relate to the reformation of the ore-bearing hydrothermal solution in late Hercynian. The study results demonstrate that the sphalerite from the stratiform orebody in the Dongfengnanshan Cu polymetallic deposit is similar with that from VMS deposits associated with submarine volcanic rocks and reformed by Hercynian hydrothermal solution.The metallogenic geological conditions, orebody characteristics, mineral assemblages, ore structures and textures also strengthen the argument.

Key words: Dongfengnanshan Cu polymetallic deposit, sphalerite, in-situ LA-ICP-MS, VMS, NE China

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References

Cook, N.J., Ciobanu, C.L., Pring, A., Skinner, W., Shimizu, M., Danyushevskiy, L., Sainieidukat, B., and Melcher, F., 2009. Trace and minor elements in sphalerite: A LA-ICPMS study. *Geochimica et Cosmochimica Acta*, 73: 4761–4791.

Xu, W.L., Pei, F.P., Wang, F., Meng, E., Ji, W.Q., Yang, D.B., and Wang, W.,2013. Spatial-temporal relationships of Mesozoic volcanic rocks in NE China: constraints on tectonic overprinting and transformations between multiple tectonic systems. *J. Asian Earth Sci*, 74: 167–193.

Yang, Q., Ren, Y.S., Sun, Z.M., Hao, Y.J., Zhang, B., Sun, X.H., and Lu, S.Y., 2018. Geochronologic evidence of Late Paleozoic magmatic-hydrothermal mineralization in Tianbaoshan metallogenic region, Yanbian area: A case study of the Xinxing lead-zinc (silver) deposit. *Acta Petrologica Sinica*, 34(10): 3153–3166.

Ye, L., Cook, N.J., Ciobanu, C.L., Liu, Y.P., Zhang, Q., Liu, T.G., Gao, W., Yang Y.L., and Danyushevskiy, L., 2011.Trace and minor elements in sphalerite from base metal deposits in South China: A LA-ICPMS study. *Ore Geology Reviews*, 39: 188–217.

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