Geological and Geochemical characteristics of albite within the Manganghe Formation, Dahongshan deposit, Yunnan Province, China: Implication for the ore genesis

Lin Hou[1,2†], Yang Guo[1], Bin Yang[1], Shengwei Wang[1], Zizheng Wang[1], and Huijuan Peng[3]

[1] *Chengdu Center, China Geological Survey, Chengdu 610081, PR China*

[2] *University of Arizona, Tucson, AZ 85721, USA*

[3] *Key Laboratory of Tectonic Controls on Mineralization and Hydrocarbon Accumulation, Ministry of Land and Resources, College of Earth Sciences, Chengdu University of Technology, Chengdu 610059, PR China*

Corresponding email: linhou_aaron@163.com

Although has been researched for decades, debate remains between volcanic origin and hydrothermal origin on the metallogenesis of the Dahongshan Fe-Cu deposit in Yunnan Province of China due to the lack of a clear understanding to the genesis of the Proterozoic sodic ore-hosting strata "Manganghe Formation" of the Dahongshan Group. In this study, we focus on the genesis of the albite in the strata, to understand the exact origin of the sodic ore-hosting strata, thus further interpret the origin of the deposit. Optical Microscope Cathode Luminescence (OM-CL) and Scanning Electron Microscope Cathode Luminescence (SEM-CL) analyses were used to observe the microstructure of the albite. The albite are mainly hosted within the metacarbonatite of Manganghe Formation, with surgary texture, which is the typical texture of metasomatism origin. In-situ elemental analyses were performed using Electro-Probe Microanalyzer (EPMA) and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), X ray diffraction were used to calculate the degree of order of the minerals. The composition of albite within the Manganghe Formation is relatively pure (SiO_2: 64.37%-71.61%, Al_2O_3:16.11%-20.44%, Na_2O: 10.72%-12.78%, $Ab_{97.26}Or_{1.28}An_{1.46}$) , with a high degree of mineral order (averagely 0.915), suggesting a low crystallization temperature (220℃ to 340℃), the enrichment of LREEs (LREE/HREE: 1.82 to 15.13) and unconspicuous positive anomaly of δEu (0.37 to 2.13), suggesting a metasomatic origin. According to the features above, we can affirm the genesis of the albite and the sodic ore-hosting strata of the "Manganghe Formation" were related to the hydrothermal alteration, rather than volcanic origin. The debris zircon of the garnet amphibolite schist have SHRIMP U-Pb ages of 2700Ma-2800Ma, 2150Ma-2250Ma, and 1800Ma-1900Ma, whereas the zircon U-Pb age of the dolerite dykes cutting the Manganghe Formation are 1661±7Ma (Zhao et al., 2017), thus the formation age of the Formation should be between 1700Ma to 1800Ma. However, the previous precise dating of the Dahongshan deposit such as Molybdenite Re-Os, Fluorite Sm-Nd yielded a mineralization age of ~1600Ma, which is 100Ma younger than the formation of the strata. The obvious textural and geochemical characteristics of the albite, together with the distinct gap in age between mineralization and wallrock formation, indicate that the Manganghe Formation was

formed as a normal carbonatite rock, then altered by the later hydrothermal activities. A metallogenesis model of the Dahongshan deposit was also proposed.

Key words: Albite, Manganghe Formation, Dahongshan deposit, Ore genesis