

Mineralogy and Geochemical Characteristics of the Xialei Manganese Deposit, Southwest Guangxi Province, China

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The Xialei manganese deposit occurs in limestones and cherts in the upper part of the Wuzhishan Formation, which is located in the Youjiang basin, southwestern Guangxi Province. The orebodies are stratiform and conformable to the host rocks. The ore-bearing section is about 10 m thick, which includes three ore layers separated by two interlayers. The footwall is argillaceous limestone and the hanging wall is siliceous sedimentary rocks. The ore texture of the Xialei deposit is dominantly microcrystalline. Ore minerals can be divided into three groups: (1) carbonate minerals including rhodochrosite, manganocalcite, and calcite; (2) silicate minerals including rhodonite, spessartite, tephorite, bementite, and chlorite; and (3) sulfide minerals including pyrite, cobaltite, gersdorffite, and galena. The grade of manganese ranges from 19.20 to 23.43% with an average of 22.07%. The carbonate minerals group occurs as the protolith rock at Xialei, they dominantly show granular texture that was cut or replaced by other minerals, and the banded carbonate minerals were thought to be the result of recrystallization process. The silicate minerals group only occurs in the middle layer of the orebody, and the minerals display banded, vein, and granular texture. The high-temperature or pressure minerals, such as spessartite and tephorite, show the influence of hydrothermal fluids. The sulfide minerals group appears as granular and vein texture. Sulfide veins are common in Xialei, especially those containing some Mn carbonate or silicate minerals. As with many hydrothermal manganese deposits, Xialei is characterized by high LREEs and low HREEs, which indicates the source of hydrothermal fluids from seafloor volcanism. The Ceanom values reflect an anoxic character for the water body during sedimentation. According to carbon and oxygen isotopic data, seawater, organic matter, and magmatic hydrothermal fluids are all suggested to have been involved in the Mn mineralization process at Xialei. We consider the origin of the Xialei manganese deposit to have occurred in two stages: (1) the protolith was deposited with the involvement of seawater, organic matter, and magmatic hydrothermal fluids, resulting in the carbonate minerals group; and (2) then the protolith was effected by later hydrothermal fluids, which caused the recrystallization of carbonate minerals and the formation of silicate and sulfide minerals.