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A New Type of Beryllium Resource from the Maka Tungsten Polymetallic Deposit, Laojunshan Ore Cluster, SE Yunnan Province, China

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1 Geological Setting

The Laojunshan ore cluster, SE Yunnan Province, tectonically located at the junction of the South China Fold Belt, Ailaoshan Suture, Yangtze Block and North Vietnam Block (Zhang et al., 1998), is an important part of the SE Yunnan belt of W-Sn polymetallic mineralization. The Laojunshan granite is surrounded by a series of super-large ore deposits, such as the Xinzhai tin deposit, the Nanyangtian tungsten deposit and the Dulong tin-zinc polymetallic deposits. Collectively, these make up a large ore cluster of Sn-W-Pb-Zn-Cu deposits that also contain a range of rare and dispersed elements (Fig. 1).

The Maka tungsten polymetallic deposit, located at the northern margin of the granite batholith, is about 9 km away from Laojunshan (Fig. 1). Strata exposed in this deposit consist mainly of Middle Cambrian Tianpeng Formation (Є2t), Longha Formation (Є2l) and lower Devonian Pojiao Formation (D1p). All have undergone metamorphism. The main ore-hosting unit is the Tianpeng Formation, which contains dark green skarn rocks, plagioclase-amphibole schist and light grey quartz-mica schist, intercalated with dolomitic marble layers or lenses.

2 Be Occurrence State

Besides economic concentrations of tungsten in this deposit, recent research shows that the Be content of most

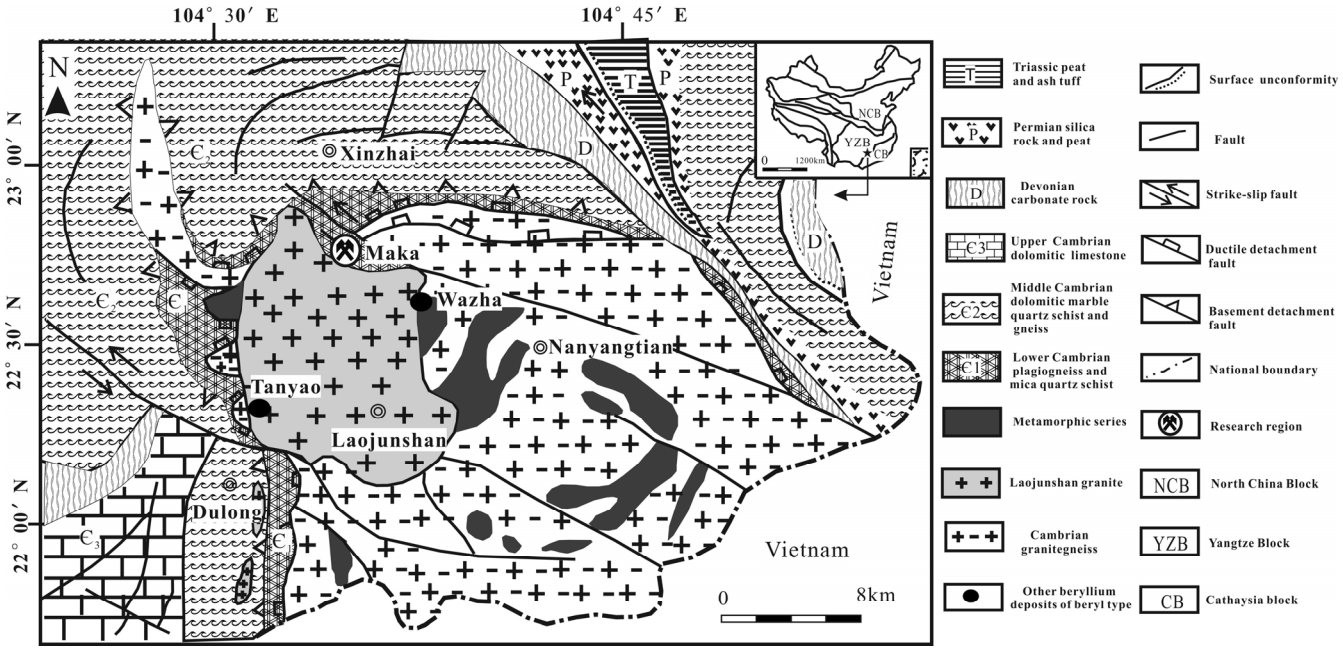

Fig. 1. Geological map of Laojunshan ore cluster (modified from Guo et al., 2009)

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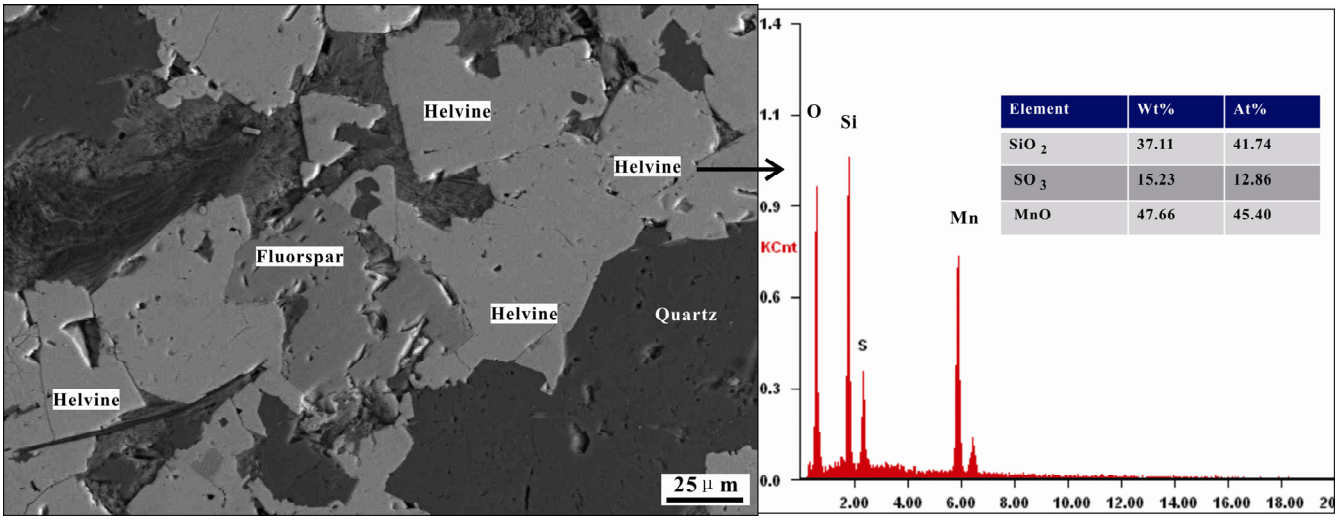

Fig. 2. Backscattered electron image and EDS spectra for helvine from the Maka tungsten polymetallic deposit

samples is also up to economic grade. The highest BeO content is 1.53%. This concentration of Be, a potential rare metal resources, can be explored and utilized in the Maka tungsten polymetallic deposit.

Samples with high Be content were investigated by Scanning Electron Microscopy (SEM). Since Be is a light element and cannot be measured by Energy Dispersive System (EDS), we paid attention to the characteristics of other elements and mineral crystal morphology. Based on measured Be content and the results of SEM analysis, Be is found to exist mainly as the independent mineral, helvine, Mn2+4(Be3Si3O12)S (Fig. 2). In this image, helvine is observed to be associated with fluorspar, which is related to tungsten mineralization in this deposit.

It is worth noting that the helvine-dominant type of beryllium resource is different from others in the Laojunshan ore concentration area. For instance, in the Wazha and Tanyao deposits, beryllium occurs mostly within beryl.

3 Genesis of the Maka Tungsten Polymetallic Deposit

Research has shown that the mineralogy of beryllium can be diverse in different types of beryllium deposits. For example, in quartz vein-type tungsten deposits, the main Be -host is beryl. This contrasts with skarn-type tungsten deposits where the main Be-mineral is helvine. We propose that the Maka tungsten polymetallic deposit contains both quartz vein-type and skarn-type mineralization. In addition, the coexistence of helvine and scheelite indicates that helvine is genetically related to the tungsten mineralization.

There are two generations of granite in the vicinity of the Maka tungsten polymetallic deposit. One is the Nanwenhe granite formed in the Caledonian; the other is the Laojunshan granite formed in Yanshanian (Guo et al., 2009). Both granites are rich in W and Be, indicating they may represent sources for the Maka tungsten polymetallic deposit. Tungsten mineralization of quartz vein-type is predominantly contained within the upper part of the deposit. So far, skarn-type tungsten mineralization has not been found. Skarn-type mineralization is, however, always related to helvine. The discovery of helvine shows not only the presence of a new type of beryllium resource but also indicates that there exists a huge potential for skarn-type tungsten mineralization at depth within the deposit.

4 Conclusions

Be occurs mainly as helvine, which is a new type of Be resource in this area.

Results will provide direction for exploration of skarn-type tungsten at depth within the Maka deposit.

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