

## Exploration of deep resources in Taoxikeng tungsten deposit: evidence from mineralogy of concealed rock mass

Yuqi Wang<sup>1</sup>, Zhao Zheng<sup>2</sup>, Shanbao Liu<sup>3</sup>, Naxin Guo<sup>4</sup>, Chunli Guo<sup>5</sup>, Pingan Wang<sup>6</sup>

<sup>1</sup>Chinese Academy of Geological Sciences, Beijing, China, [517129391@qq.com](mailto:517129391@qq.com)

The Taoxikeng tungsten deposit is one of the most typical quartz vein type tungsten deposits in south China. With the simultaneous development of the external and internal big vein type tungsten ore, the proved WO<sub>3</sub> reserves are more than 60,000 tons. The Taoxikeng tungsten deposit is located in the compounding belt between the eastern segment of the E-W-trending Naling tectonic zone and the southern segment to the NE—NNE Zhuguanshan tectonic and Magmatic belt. It belongs to the chongyu ore concentration area with the largest intensity of forming tungsten ore in China. The strong tectonic thermal events since the Mesozoic in the eastern part of Nanling led to the multi-group composite structures of NW and EW-NE, which became the most important ore-controlling factor in this area. The intense granitic magmatism in the yanshanian period provided the main metallogenic material for the formation of the tungsten-tin polymetallic deposit in the taoxikeng mine area. In the past five years, relying on the national deep earth resources exploration and the ministry of natural resources' deep prospecting demonstration project, not only concealed rock mass were found in the deep part of the Taoxikeng vein ore body, but also a new type of internal belt tungsten ore vein group was found in the concealed rock mass. This provides new information for the summarization and exploration of the tungsten metallogenic regularity in Nanling area, indicating that there is still important prospecting potential in the concealed rock mass deep in the quartz vein tungsten ore. On this basis, this paper established the tungsten ore metallogenic model in Taoxikeng, Taoxikeng tungsten type has external and internal tungsten ore (370□~270□, 320□~250□). The mineral assemblage within the vein group is similar, the grain shape of wolframite external belt is better than inner belt, the later tungsten copper composition is formed within the inner belt, and the external belt and inner belt are similar in the ore-forming era (~156Ma).

Through the study of deep concealed granite exposed by downhole drilling in the construction of Taoxikeng mining area, the analysis of potential tungsten formation in the deep rock of this type of tungsten deposit was further carried out., combined with EPMA analysis and LA-ICP-MS analysis, micro-component analysis of fluid inclusions in concealed granite and concealed quartz veins, inversion of the magmatic and hydrothermal phases of the Taoxikeng deposit, characteristics of each stage And mineralization potential, characteristics of each stage And mineralization potential, the magma stage of the area is divided from early to late: medium-grained biotite granite - medium-grained mica granite - fine-grained biotite granite - fine-grained rock - greisen- medium-grained monzonitic granite - diorite veins. The enrichment of the apatite U and Th in the concealed rock mass reflects the rich U and Th in the early magma, and the higher content of F in the apatite and muscovite, which will be beneficial to The migration and enrichment in the melt of the late remnants of W. The Al-rich characteristics of biotite is different from that of S-type granite, combining with geochemical characteristics of apatite, shows that the Taoxikeng concealed rock mass has A-type granite characteristics. Concealed rock masses are strongly depleted of trace elements such as Eu, Ba, Sr, Ti, Ba, etc, indicating that the concealed rock mass experienced a strong separation and crystallization during the formation process. The petrological and mineralogical features together indicate that the Taoxikeng concealed rock mass is a typical tungsten-forming granite. The strong internal zone alteration, high volatile components and better sealing conditions indicate that the deep part still has great prospecting potential. This provides a solid theoretical basis for the deep exploration of the Taoxikeng deposit and is undergoing gradual verification.