A comparison of mineralization study between Zhou’an and Jinchuan copper-nickel sulfide deposit

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Zhou’an deposit is not only the first large PGE-Cu-Ni deposit found in Henan province, but also the largest PGE deposit and the largest nickel ore deposit in Qinling-dabies orogenic belt. Moreover, it is the unique large PGE-Cu-Ni deposit completely buried and difficult to been recognized in China. While Jinchuan super-large Cu-Ni sulfide deposit is the typical representative of magmatic liquation mineralization. So according to the research idea of Comparative Metallogeny, system analysis, comparison and research of the two Cu-Ni deposits will be taken from the aspects of geological setting, rockbody and orebody characteristics, geochemistry and mineralization, and the generality and the diversity of two deposits will be found, which can help us understand the genesis of Zhou’an deposit deeply and discuss its law of formation and distribution for more effectively guiding prospecting.

Similar characteristics: Zhou’an deposit is located in the southwestern margin of the Nanyang basin, in the south of Shangdan fault, which is tectonically belonging to the northern margin of South Qinling orogenic belt. Similarly, Jinchuan deposit is also located in large fault zone which is called Longshoushan Fault. Comparative research suggests the two deposits both have gravity anomaly, magnetic anomaly and geochemical anomaly. The horizontal projection area of Zhou’an rockbody is 2.25km2, a little larger than Jinchuan rockbody in scale (1.34 km2), with oval-shaped, bowl-shaped or dike-shaped in the profile of exploration lines. The mineralization of the two deposits are both closely related to ultramafic rockbody, having little difference of ore minerals.

Various characteristics: The comparative research suggests that various types of ultrabasic-basic rocks occurred different geological environment and different intruded mechanism can bring about different types of nickel sulfide deposit. Compared with Zhou’an nickel sulfide deposit, Jinchuan superlarge copper-nickel sulfide deposit mostly related with mafic-ultramafic complex that multiple intruded. It is the products fromed by picrite tholeiite magma melted from upper mantle during pulse intruding caused by intermittent crustal extension and stress release, with the rock type of dunite-lherzolite-plagiolherzolite. Its metallogenesis include magma differentiation-crystalization, sulfurization process, magma melt-segregated, and hydrothermal process, whereas magma melt-segregated ore-forming process played an important role, and hydrothermal process is secondary. Substance of rock-forming and ore-forming in both Zhou’an and Jinchuan Cu-Ni deposit mainly derived from the upper mantle, the former source is enriched mantle, while the latter is relatively depleted mantle. The type of Zhou’an rockbody belongs to pyroxene peridotite-lherzolite, mainly is lherzolite. It is the products fromed by high magnessian basaltic magma melted from upper mantle by tectonic emplacement. The orebodies mainly distribute in the inner contact zone of the rockbody containing two parts: “upper ore zone” is the alteration zone in the top of rockbody, and “lower ore zone” is the alteration zone in the bottom of rockbody. The morphology and occurrence of the ore zone is basically in accordance with that of the top and the bottom surface of rockbody. The deposit mainly is composed of fine grained disseminated and mass disseminated orebodies, the minority is fine veinlet, without sideronitic texture. While, the orebodies of Jinchuan are mainly located in the middle and the lower of the rockbody containing in-situ liquation orebody, melting penetration orebody, injection orebody in late period and contact metasomatic orebody, which showing the morphology of stratoid, lentoid or lenticular, most with sideronitic texture.

In short, the mineralization of Zhou’an and Jinchuan copper and nickel deposits is distinctive. Most of the copper nickel deposits such as Jinchuan mostly produced from ultrabasic rocks and basic-ultrabasic complex in the lower part of the bottom, However, Zhou’an copper nickel deposit is mainly distributed in the edge of the ultrabasic rock, or distributed around the rock discretely, and there is basically no mineralization in central of the rockbody and the wallrock. The mineralization of Zhou’an deposit is closed related to hydrothermal alteration and is difficult to explain by the theory of magmatic differentiation and magmatic liquation, which is worthy for further study.