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# Discussion on Changdagou Porphyry Copper Deposits Mineralization Model in Dege, Sichuan Province

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## 1 Introduction

Being located in the eastern edge of the Tibetan plateau,the geological structure of western Sichuan presents significant complexity and diversity because of the interaction of the India plate,the Pacific plate and the Eurasian plate. Its unique evolutionary process and intense both structure and magma activity create favorable and special metallogenic geological environment,making it an important metal metallogenic area. Porphyry copper polymetallic deposits in Yidun island arc relating to acidic shallow-ultra shallow intrusive magmatic activity concentrate in the southern section of main island arc zone-Xianggelila tectonic magmatic zone which mainly produced in Indosinian and acted approximately in 208-235Ma. There are Pulang large porphyry copper and Xuejiping medium porphyry copper. No porphyry copper was found before the 1970s in the northern Yidun island arc until Changdagou porphyry copper deposits which is large-scale and high-grade has been researched.

## 2 Geological Characteristics

Changdagou copper deposits is located in the southern Ezhi-Zhuqing fault zone and the southeastern Gaiba-Lerong compound synclinal which is well developed. The north-west trending folds and faults (reverse fault) are the main structures,followed by north-east trending faults (normal fault). Acidic intrusive rocks of shallow and ultra-shallow develop well and form lentoid dikes and some stocks intruding into sand slates of Tumugou group and Lanashan group in early Yanshanian. Orebody lie in the granodiorite-porphyry rock. Above the ore-bearing porphyry,carbonaceous slate presents an obvious malachitization. Ore types can be divided into disseminated ores(Fig. 1) mainly distributing in porphyry and ore veins mainly distributing in the contact zone between porphyry and the host rock. 8mm wide brass vein is visible in one mineral and the major metallic mineral are the pyrite and the chalcopyrite. Besides, there are disseminated ores consist of pyrite,70% quartz and a few biotite.

Based on the petrological and geochemical study,Changdagou ore-bearing porphyry pluton formed in the island-arc environment and its geochemical characteristics,high Sr and low Y,are equal to adakites' properties. Changdagou porphyry pluton formed in 216Ma by the data of zircon isotope dating experience. The REE pattern exhibits LREE enrichment and negative Eu anomalies,with a significant fractionation of LREE but almost no fractionation of HREE.

Through the microscope observing,a microscopic phenomenon that sphalerite contains emulsible chalcopyrite gives some explanations objectively that ore-forming hydrothermal fluids forming Changdagou porphyry copper deposits is medium-high temperature hydrothermal fluid and formation of the deposits follows the emplacement of granite pluton (Fig. 2). In the late period of acidic magma activities,the ore-bearing acidic magma intruding upward into carbonaceous slate leads to the a significant decline of temperature and pressure. This process results in an obvious decrease of the solubilities of volatile in the magma,and the overflowing volatile enters into magmatic hydrothermal fluids. In addition,it also accelerates the increase of volatile in the magmatic hydrothermal fluids that magmatic crystallization differentiation leads to supersaturation of the volatile. The volatile complex ore-forming elements strongly and improve solubility of them in hydrothermal fluids. Therefore,with the increase of the volatile in post-magmatic hydrothermal fluids, ore-forming elements in magma gather to post-magmatic hydrothermal fluids constantly. If there's no physical barrier,it's easy for volatile-rich hydrothermal fluids which assembled in the front of the whole hydrothermal fluids system to

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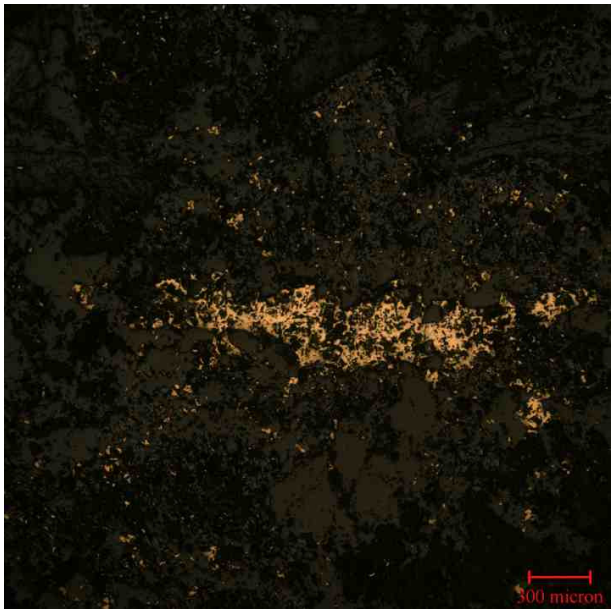


Fig. 1. The ore with disseminated structure.

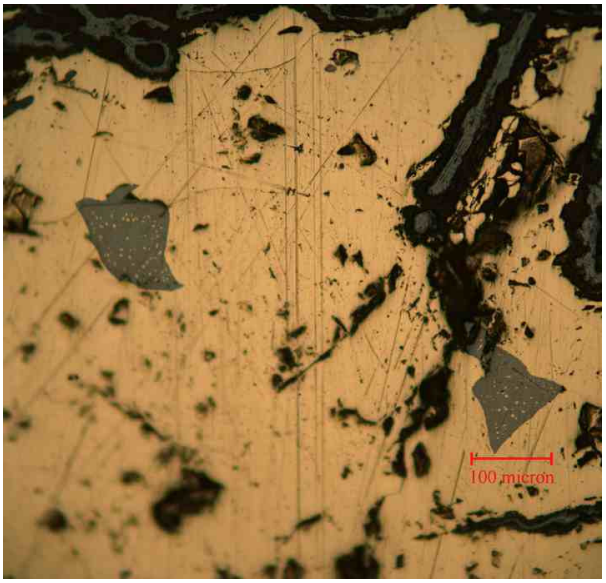


Fig. 2. Sphalerite with emulsible chalcopyrite.

disappear,even most of the ore-forming materials in the whole hydrothermal fluids suffer this process at the same time. The carbonaceous slate above Changdagou granite porphyry have poor permeability and better shielding,so hydrothermal fluids with ore-forming materials and volatiles are prevented to disappear effectively,and ore-forming materials are forced to sediment and generate disseminated orebody in magma. Meanwhile,in the process of emplacement,some fissures formed in the host rock next to the emplacement channel-way and were full of hydrothermal fluids with volatile and ore-forming materials and form gangue mineral eventually.

## 3 Conclusion

According to observation of the field geological phenomenon,analyzation of the typical geological samples and minerals' identification with the microscope, metallogenic model of Changdagou porphyry copper deposits produced. As the ore-bearing pluton,granite porphyry which mainly consist of mantle are formed by re-stimulation and shallow emplacement of island-type magma storing in island arc belt. This kind of porphyry stores in pressed and closed environment and generates in the tension direction mainly distributing in the west of arc granite belt.

## Acknowledgements

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