1 Introduction

We have achieved a great breakthrough in prospecting at Jima porphyry deposit which is a large deposit of economically significance and scientific significance at Gangdese metallogenic belt. It has accumulated identified more than 7 million tons of copper metal reserves, a total of associated molybdenum, lead and zinc, gold, silver reserves more than large scale. We have finished a lot of research work in ore deposit geological characteristics, the distribution regularity of ore-forming elements, the diagenetic and metallogenic geochronology, ore-forming material source, source and evolution of ore-forming fluids, characteristics of the fissure (vein) system and control structure of rocks and deposit (Tang et al. 2010; Zheng et al. 2012), and we have been achieved a series of research results. Based on the fully collecting, sorting the latest exploration and research results, it has carded and analyzed the geological features and metallogenic model of the Jiama porphyry deposit systematically, aiming at providing some references for the similar deposits in Gangdese metallogenic belt.

2 Geological Background

Jima porphyry deposit is located in the south central of Tibetan Tethys tectonic domain Gangdese-nyainquentanglha Terrane. The stratigraphy of Jima and adjacent areas are mainly passive continental margin volcanic sedimentary rock series, including the Upper Triassic Mailonggang Formation (T₃m), the Middle-Lower Jurassic Yeba Formation, the Upper Jurassic Quesangwenquan Formation (J₃q) and Duodigou Formation (J₃d), the Lower Cretaceous Linbusong Formation (K₁l), Chumulong Formation (K₁c) and Talongla Formation (K₁t). The regional magmatic rocks mainly distributed in the north of the Yaluzangbu Suture Zone, which is an important part of the Gangdese volcanic-magmatic arc. Various intrusions in Jima porphyry deposit comprise granite porphyry, granodiorite porphyry, monzonite porphyry, quartz diorite porphyry, diabase and lamprophyre. The major ore-bearing porphyries include granite porphyry, monzonite porphyry and granodiorite porphyry. The tectonic line of southern Gangdese-nyainquentanglha Terrane overall trend EW, due to the long-term regional strike-slip effect, mostly secondary structure line NW, deep buried structure due to the North East. A number of NW thrust systems were developed in southern Gangdese-nyainquentanglha Terrane due to the India-Eurasia collision. Jima porphyry deposit is controlled by the Jima-Kajunguo thrust systems and Tongshan gliding nappe.

3 Ore Deposit Geology

3.1 Characteristics of Orebody

Jima deposit is a “quaternary” type porphyry-skarn deposits which is mainly comprise of molybdenum ore body bearing in upper Linzongbu formation, Cu polymetal ore body bearing in medi-interlayer tectonic zone and porphyry contact zones, Cu-Mo ore body bearing in bathy-hidden porphyry and Au ore body bearing outside of structure fracture zone. Four types ore body are related closely about time, space and genesis, and they constitute a unified Jima porphyry systems together. The skarn Cu polymetallic ore body is the most important type at Jima, with the characteristics of large-scale, numerous ore-forming elements, high-grade and wide distribution. The skarn ore body is mainly affected by the medi-interlayer tectonic zone and porphyry contact zones, buried and half-buried, bedded, thick plate production. The hornfels Cu-Mo ore body is mainly controlled by the
fissure system in the top rock of Linbuzong Formation produced by invasion. It is an important ore type discovered after the prospecting breakthrough of skarn ore body, with large reserves, low-grade, large ore body thickness, mainly Cu-Mo mineralization, associated Au and Ag, almost no Pb and Zn. The ore body is cylindrical produced in the upper part of the deep porphyry, which is located between 5200-4300 meters elevation. The strike of ore body is NW-SE, extending 1200 meters, and it is nearly upright, vertical extension of up to 900 meters. The porphyry ore body is mainly controlled by folds and faults. It is another important prospecting breakthrough after the thick skarn ore body breakthrough with the hornfels ore body as a sign. The ore body is produced in the center of Jiama district, which is located between 5000-4300 meters elevation. The strike direction is NW-SE, extending 500 meters; nearly upright, vertical extension of up to 500 meters. The discovery of porphyry ore body perfec
ts the Jiama porphyry-skarn deposit model, which confirms magmatic hydrothermal mineralization genesis of view. The Au ore body is mainly controlled by the external tensional faults. The bodies are produced in the fault structure alteration zone outside the scope of porphyry center, which mostly are epithermal-type ore body. The Au ore body can be subdivided into three categories by the different of host rocks and occurrence. They are Au body bearing in skarn, Au body bearing in slate and hornfels, Au body bearing in quartz diorite porphyry.

3.2 Ore Types

It can be classified into sulfide ore, oxide ore and mixed ore categories according to the degree of oxidation of the ore at Jiama. The oxidation zone and secondary enrichment zone are not developed at Jiama, the oxidized depth is not great, and the sulphide ore is the main ore type. Classified according to the structure, the main ore type is disseminated ore and veinlet ore, which accounting for more than 95% of the total amount of ore, and the minor is dense disseminated ores, banded ore, lump ore. Classified according to the structure the useful minerals and combination, there are seven categories: chalcopyrite ore, bornite ore, and chalcopyrite-bornite ore, tetrahedrite ore, chalcopyrite-molybdenite ore, molybdenite ore, galena-sphalerite ore. Classified according to the industrial indicators with each element, it can be divided into Cu ore, Cu(Mo) ore, Cu-Mo ore, Mo(Cu) ore, Mo ore, Cu-Pb-Zn ore and Au ore. Classified according to the host rocks, the ore types include skarn-type ore, hornfels-type ores, marble-type ore, porphyry-type ore and tectonic breccia-type ore. The main metallic minerals include chalcopyrite, bornite, tetrahedrite, chalcocite, covellite, molybdenite, galena, sphalerite, nickel mineral, bismuth miner, pyrite, blue chalcocite, malachite, chrysocolla, azurite, native copper, native gold, native silver, realgar, orpiment, specular hematite, cuprite, limonite, etc.

3.3 Wall Rock Alteration

There are two category wall rock alteration at Jiama, including thermal contact alteration and metasomatic alteration. The alteration types include hornfels, marbleization, skarnification, sericitization, silicification, biotitization, epidotization, chloritization, carbonation, potassic alteration, mudding, etc. The alteration can be divided into four stages: magmatic stage, thermal contact metamorphism stage, skarn stage and hydrothermal stage. The alterations in magmatic rocks are mainly as potassic alteration, pyrite sericite alteration, silicification, propylitic alteration, mudding, which are similar to the common alteration in porphyry copper deposit. Because of the magma emplacement, the carbonate of Duodigou formation form marbleization and the sandstone and slate of Linbuzong formation form hornfels alteration. From the top to bottom in space, the total alteration distribution as: hornfels alteration, garnet skarnification + diopside skarnification + wollastonite skarnification, marbleization.

References
