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## Ore-controlling Characteristics of Synchronous Faults of Dongshengmiao Polymetallic Sulfide Deposits in Inner Mongolia

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### 1 Introduction

The Dongshengmiao deposit is a super-large Zn-Pb polymetallic sulfide deposit which occurring in the Langshan-Zhaertaishan metallogenic belt, and located in the western margin of the North China Platform. The ore-bodies of Dongshengmiao deposits are mainly hosted in the second Formation of Langshan Group.

There are some studies on the geological characteristics (Peng et al., 2004), geological and geochemical characteristics of ore-bearing rock series (Gao et al., 2014), Fe isotopic characteristics (Gao et al., 2016), mineralization process and sources of metallogenic materials (Gao et al., 2015), genesis and volcanic interbeds (Peng et al., 2007a,b,c; Peng et al., 2010; Zhai et al., 2004) Dongshengmiao deposit.

This introductory paper provides a summary of the ore-controlling characteristics and ore-forming process of synchronous faults in Dongshengmiao deposits. The recent years studies show that some evidences for synchronous faults occurring in the deep ore-bearing Formation are founded in Dongshengmiao Zn-Pb-Cu sulfide deposit, and confirm that there were obvious syn-sedimentary faults activities in Mesoproterozoic exhalative-sedimentary ore-forming process. Syn-sedimentary faults play an important role on the sedimentary mineralization and volcanic activities, and is an important factors to determining the size and spatial distribution of the orebodies.

### 2 Regional Geological and Tectonic Setting

The Dongshengmiao deposit is located at Langshan orogenic belt which is located in the western margin of

the North China Platform. Langshan orogenic belt has experienced a long-term and complicated geological tectonic evolution and mineralization process which can divided into several stages: the crystalline basement were formed in Neoproterozoic, and then deformed in Early Proterozoic, the passive continental margin aulacogen was formed in Mesoproterozoic, the continental margin activities in late Neo-Proterozoic and the development of compression and orogeny from Hercynian to Mesozoic with considerable intrusion of acid-intermediate magma and a great amount of Zn, Pb, Cu, Fe, Au mineral resources was formed. The types, scales and the regulations of temporal and spatial distribution of these ore deposits show a close coupling relationship with ore-forming geological setting and tectonic evolution. The different types deposits were formed in each stage of geological tectonic evolution process of Langshan orogenic belt.

### 3 Ore-controlling Characteristics of Synchronous Faults

The ore-controlling characteristics of syn-sedimentary faults in Dongshengmiao as follows:

(1) In the early of Mesoproterozoic, Dongshengmiao deposit was located in coastal location near the paleo-continental margin, accepted landmass debris sediments and formed the 1st ore-free formation of Langshan group which consists of quartz sandstone and sand shale. In the same time, the syn-sedimentary faults are relatively weak in ore-bearing basin.

(2) In the middle of Mesoproterozoic, with the extension of sedimentary basin and the increasing of the water depth, the 2nd formation of Langshan group entered into exhalative-sedimentary stage. In the same time, the syn-sedimentary faults are very obvious in ore-bearing basin. The ore-controlling characteristics of syn-sedimentary faults on rock-forming and ore-forming

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as follows:

①Syn-sedimentary faults led the drastic changes of lithofacies and lithology of the ore-bearing strata, and controlled the formation and the spatial distribution of orebodies.

②Syn-sedimentary faults led the submarine volcanic eruption, the deep ore-forming fluids exhaling into sea basin, and controlled the formation and the spatial distribution of orebodies. Syn-sedimentary faults served as a channelway for the deep rock-forming and ore-forming fluids exhaling into the ancient aulacogen basin. In the falling wall of the syn-sedimentary faults, Dongshengmiao deposits have many kinds of mineralization types, high mineralization degree and the thickened Zn-Pb-Cu complex orebodies. Dongshengmiao deposit metamorphic basic volcanic rocks with linear distribution feature is drastically thickened near syn-sedimentary faults and drastically thinned or disappeared away from syn-sedimentary faults.

③The frequency and continuity of the syn-sedimentary faults activities are the main factors which controlled the size of Dongshengmiao deposit. In the sedimentary stage of the 1st member of the 2nd ore-bearing formation, syn-sedimentary faults have existed, and located in the bottom of the 1st member of the 2nd ore-bearing formation of Langshan Group. With the development of crust movement, syn-sedimentary faults continue their movement and cut deep into the crust. In the later sedimentary stage of the 1st member of the 2nd ore-bearing formation of Langshan Group, the Dongshengmiao deposits double-peaking volcanic rocks interbeds is formed, and the extension of ore-bearing basin became stronger than that of before; meantime, the preparations for the deep ore-forming fluids continuously exhaling into the ore-bearing basin along the syn-sedimentary faults. In the sedimentary stage of 2nd members and 3rd members of the 2nd formation of Langshan Group, abundant Zn, Pb, Cu, Fe ore-forming elements exhaled into the ore-bearing basin along the syn-sedimentary faults, and formed Dongshengmiao super-large Zn-Pb-Cu-Fe sulfide deposit.

(3) In the latter of Mesoproterozoic, Dongshengmiao ore districts again located in coastal location near the paleo-continental margin, accepted landmass debris sediments and formed the 3rd ore-free formation of

Langshan Group and the Liuhongwan formation of Zha'ertaishan group, which consist of quartz sandstone and sand shale. In the same time, the syn-sedimentary faults are relatively weak in ore-bearing basin.

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