Granularity and geochemistry of olivine in Jinchuan Ni-Cu-PGE magmatic sulfide deposit

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The Jinchuan Ni-Cu-PGE deposit is the third largest magmatic Ni deposit in the world, hosted by a small ultramafic intrusion in the Longshoushan terrane located in the south-western part of the North China Craton.

Granularity of olivine in the Jinchuan complex is from 1-8mm in diameter.Those olivine with 6-8mm distributes in ore-body 24, only contains disseminate sulfide; the olivine with 3-6mm still mainly lies in ore-body 24 contain partial net-texture sulfide; the olivine with 1-3mm in diameter distributes all mine, including most net-texture ore and no-sulfide rocks.

Our datum prove forsterite contents (mol. % Fo) of olivine in the Jinchuan rocks are in the range of 83.9-85.5% in pyroxene-bearing peridotite (no sulfide, olivine 1-2mm in diameter, at the surface of ore-body 2), 82-83.5% in dunite and lherzolite (mostly net-texture sulfide, olivine 1-3mm or 6-8mm in diameter, in ore-body 1, 24), and 78-81% in olivine pyroxenite (partial net-texture sulfide or no sulfide with tremolite, olivine 1-2mm in diameter, in ore-body 1, 2) (Fig.1). Little variation within one sample is observed for olivine.

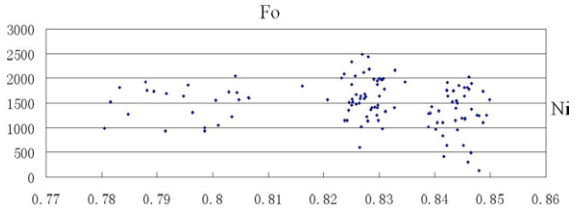

Figure 1: Compositional variations of different types of olivine from the Jinchuan rocks

So Granularity and forsterite contents of olivine have no accordant variation; Most net-texture sulfide ore holds forsterite contents from 82-83.5%, indacating the main ore-forming condition; 83.9-85% in pyroxene-bearing peridotite with no sulfide and stabilized Ni contents in olivine means olivine has partially crystalized before sulfur saturation as the decrease of temperature.Three type of forsterite contents means three types of rock-forming conditions, maybe three middle magma chambers.

This work is supported by the NSFC (grants 41072058).

An Atomic Force Microscope study of the microstructure of 'barkinite' liptobiolith

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Using Atomic Force Microscope (AFM) to observe the surface of 'barkinite' and vitrinite in nanoscale, reveal the surface microstructures of 'barkinite' and vitrinite, that is, the netlike structure of vitrinite macromolecular clusters and the fiberlike, granular, and netlike structure of 'barkinite' macromolecular clusters. With increasing maturity, the structure of 'barkinite' macromolecular clusters are fiberlike - granular - irregular netlike - netlike in sequence (Fig.1), while the structure of vitrinite macromolecular clusters change from loose, irregular network to highly orient arranged, regular network. Quantitative analysis of the structure of macromolecular cluster and arrangement in maceral by using cross - section analysis tool of Atomic Force Microscope provide a new approach to study the structure evolution of maceral molecule and hydrocarbon generation mechanism.

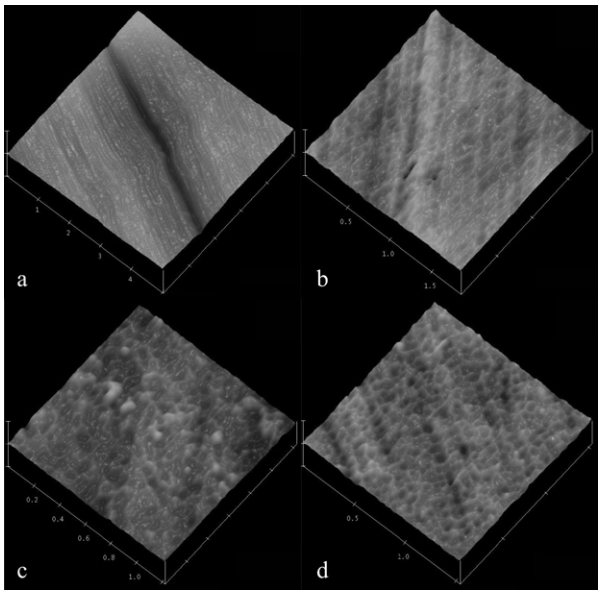

Figure 1: Microstructure evolution model of "barkinite" (a-gas coal, b-gas-fat coal, c-fat coking coal, d-anthracite)