HUANG Zhu, YANG Jingsui, ZHU Yongwang, XIONG Fahui, LIU Zhao, ZHANG Zhongming and XU Wei, 2015. The Study of Deep Mineral Association in Chromitites of the Hegenshan Ophiolite, Inner Mongolia, China. *Acta Geologica Sinica* (English Edition), 89 (supp. 2): 30-31.

The Study of Deep Mineral Association in Chromitites of the Hegenshan Ophiolite, Inner Mongolia, China

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Previously reported in the Mesozonic Tibet and the early Paleozoic Polar Ural,Russia , diamond and other deep minerals are found in ophiolite mantle peridotite chromite that need to be reconsidered ophiolite and chromite traditional understanding of the causes of shallow. The ophiolitic chromitite can be divided two classes, the high-Cr chromitite and high-Al chromitite. Most of the early studies of chromitites in China focused on high-Cr varieties, particularly in Tibet and the Polar Urals, leaving unanswered the question of whether such minerals also occur in high-Al varieties. In order determine whether high-Al chromitites also contain diamonds and to investigate the formation processes of the Hegenshan podiform chromitites, we carry out the mineralogy in chromitites of the Hegenshan ophiolite, Inner Mongolia, China.

The Hegenshan ophiolite lies in the Inner Mongolia-Daxinganling orogenic belt, a part of the Central Asian orogenic belt, including both the Altaids and Manchurides Approximately 2000 kg of mainly disseminated chromitite ore were collected from orebody 3756. Minerals were separated at the Institute of Multipurpose Utilization of Mineral Resources, Zhengzhou, China and the samples were handpicked under a binocular microscope. Mineral identifications are based on optical properties and Raman spectroscopy. Preliminary studies have identified more than 30 mineral species in addition to diamonds and moissanite. The other minerals include oxides (mostly

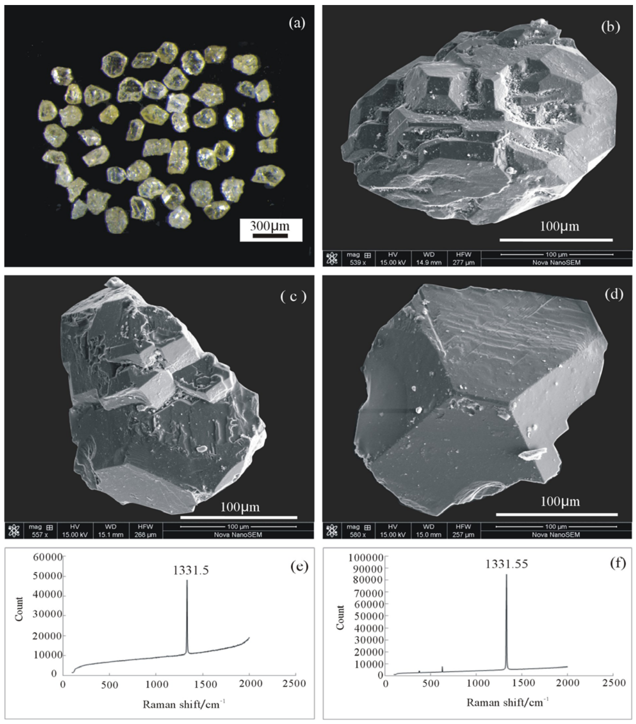

Fig. 1. Microphotograohs (a), Secondary electron images (b, c, d), and Raman spectrograms (e, f) showing the characteristics of diamonds from the chromitite of No.3756 chromite deposit, Hegenshan ophiolite.
(a), Microphotograph showing abundant light yellow and colorless diamonds from the chromitite; (b), Secondary electron image showing cuboctahedral diamond; (c), Secondary electron image showing octahedral diamond; (d), Secondary electron image showing striations on the diamond surface; (e), (f), Raman spectrograms showing diamond characteristic shift at 1331 cm^{-1} - 1333 cm^{-1}.

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hematite, magnetite, rutile, anatase, cassiterite, and quartz), sulfides (pyrite, marcasite and others), many silicates (magnesian olivine, enstatite, augite, diopside, uvarovite, pyrope, orthoclase, zircon, sphene, vesuvianite, chlorite and serpentine) and others (e.g., calcite, monazite, glauberite, iowaite and a range of metallic alloys). More than 130 grains of diamond have been recovered so far (Fig. 1.). They are mostly light yellow, transparent, broken crystals, 200-300 μm across, many of which retain well-developed crystal faces. About 60 grains of moissanite have been identified. Under the binocular microscope, they are colorless to bluish-green, light to dark blue, angular fragments, 100–200 μm across.

This study demonstrates that diamonds, moissanite and other unexpected minerals can occur in high-Al, as well as high-Cr chromitites. It also indicates there is need to re-evaluate the formation and tectonic setting of Hegenshan ophiolite and the chromitites.