

HUANG Zhu, YANG Jingsui, ZHU Yongwang, XIONG Fahui, LIU Zhao, ZHANG Zhongming and XU Wei, 2015. The Discovery of Diamonds in Chromitite of the Hegenshan Ophiolite, Inner Mongolia. *Acta Geologica Sinica* (English Edition), 89(supp. 2): 32.

The Discovery of Diamonds in Chromitite of the Hegenshan Ophiolite, Inner Mongolia

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Diamonds, moissanite and a variety of other minerals, similar to those reported from ophiolites in Tibet and northern Russia (Yang et al., 2011), have recently been discovered in chromitites of the Hegenshan ophiolite of the Central Asian Orogenic Belt. The Hegenshan ophiolite is located in Xilinhaote, Inner Mongolia, 180 km north of Chaokewulasumu, where it is one of a cluster of mainly ultramafic blocks. It consists chiefly of partly serpentinized peridotite and dunite, overlain by a thin cumulate sequence containing plagioclase-bearing dunite, troctolite, gabbro and minor anorthosite. Sheeted dikes are absent but small mafic dikes are locally common in the ultramafic sections. Overlying the cumulate section is a thin layer of mafic lava, radiolarian chert and greywacke. The chromitites are small, podiform and vein-like bodies hosted in dunite, clinopyroxene-bearing peridotite, troctolite and gabbro. All of the analysed chromitite is relatively alumina-rich, with average Cr#s of about 45–55. 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 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. 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 significantly extends the geographic and age range of known diamond-bearing ophiolites.

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