American Mineralogist, Volume 102, pages 1101–1113, 2017

Deep mantle origin and ultra-reducing conditions in podiform chromitite: Diamond, moissanite, and other unusual minerals in podiform chromitites from the Pozanti-Karsanti ophiolite, southern Turkey

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Abstract

The Pozanti-Karsanti ophiolite situated in the eastern Tauride belt, southern Turkey, is a well-preserved oceanic lithosphere remnant comprising, in ascending order, mantle peridotite, ultramafic and mafic cumulates, isotropic gabbros, sheeted dikes, and basaltic pillow lavas. Two types of chromitites are observed in the Pozanti-Karsanti ophiolite. One type of chromitites occurs in the cumulate dunites around the Moho, and the other type of chromitites is hosted by the mantle harzburgites below the Moho. The second type of chromitites has massive, nodular, and disseminated textures. We have conducted the mineral separation work on the podiform chromitites hosted by harzburgites. So far, more than 100 grains of microdiamond and moissanite (SiC) have been recovered from the podiform chromitite. The diamonds and moissanite are accompanied by large amounts of rutile. Besides zircon, monazite and sulfide are also very common phases within the separated minerals. The discovery of diamond, moissanite, and the other unusual minerals from podiform chromitite of the Pozanti-Karsanti ophiolite provides new evidences for the common occurrences of these unusual minerals in ophiolitic peridotites and chromitites. This discovery also suggests that deep mantle processes and materials have been involved in the formation of podiform chromitite.

Keywords: Ophiolite, chromitite, diamond, moissanite