

Ca-perovskite: A first report of a lower mantle mineral in ophiolite-hosted diamond

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In recent years we have confirmed the existence of a new class of diamonds on Earth, termed ophiolite-hosted diamonds, which occur in mantle peridotites and podiform chromitites of many ophiolites. These diamonds differ significantly from most kimberlite varieties and metamorphic diamonds in a subduction zone, particularly in their range of inclusions and isotope compositions ($\delta^{13}\text{C} = -18$ to -27). The discovery of Qingsongite and stishovite pseudomorphs in the Luobusa chromitite, has lead us to propose a model for the deep (>300 km) formation of ophiolite-hosted diamonds and chromitites. Here we report the first discovery of perovskite as mineral inclusions in diamond from podiform chromitite in the Hegenshan ophiolite of Inner Mongolia and the Sartohai ophiolite of Xinjiang, both of Paleozoic age. The mineral inclusions were identified by using FIB and TEM analyses at the GFZ. Ca-silicate perovskite in diamond from the Sartohai chromitite occurs as a 60-nanometer, euhedral grain associated with Ni-Mn-Co alloy and graphite. Ca-silicate perovskite in diamond from Hegenshan chromitite occurs as a 50 nanometer grain within a large inclusion containing both Ni-Mn-Co alloy and Nd-Se-Cu-S phase. By EDS the chemical composition of the perovskite is Ca 48.3%, Si 37.7% and Mn 14.1% with oxygen. TEM diffraction data show that the Hegenshan inclusion has d-spacings and angles between adjacent lattice planes consistent to the Ca-silicate perovskite with an orthorhombic structure (Li et al., 2006).