

LETTERS

Rock-forming moissanite (natural α -silicon carbide)

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ABSTRACT

We report the first occurrence of moissanite (SiC) as a rock-forming mineral (8.4 vol%) in one unique specimen of a terrestrial rock. The sample has a homogeneous, porphyritic texture, and was found as a beach pebble thought to be derived from a Tertiary volcanic province of the Aegean Sea region. The matrix is bluish-colored and consists of very fine-grained brucite, calcite, and magnesite, in which macrocrysts of quartz (25.3 vol%) and moissanite are found. Other accessory phases are phlogopite-3*T*, magnesiochromite, an Fe-rich phase, Cl-bearing brucite, Al-rich orthopyroxene, and unidentified MgFe-silicates (4 vol%). The bulk-rock composition shows a “kimberlitic” chemistry (55.8 wt% SiO₂, 28.5 wt% MgO, 1.4 wt% CaO, 18.1 wt% LOI). Colorless gemmy, and blue or black moissanite crystals are subhedral and display characteristic hexagonal symmetry (6*H* polytype). Most moissanite grains contain metallic Si and Fe-silicide (Fe₃Si₇) inclusions, and more rarely, other Fe-silicides with varying amounts of Al (≤ 24.5 wt%), Ca (≤ 8.0 wt%), Mn (≤ 6.8 wt%), Ti (≤ 16.3 wt%), and Ni (≤ 2.6 wt%). The $\delta^{13}\text{C}$ value of the moissanite is -28.1% . According to available data, the f_{O_2} stability field of SiC is five to six log units below the iron-wüstite (IW) buffer curve. Therefore, the observed Fe-bearing silicates cannot have been equilibrated with SiC under ambient pressure. Instead, our finding indicates that the rock most likely formed at the ultrahigh-pressure conditions of the upper mantle or transition zone.