



Moissanite (SiC) from mica schists from Sakar Mtn – occurrence and petrological significance

Моасанит (SiC) от слюдени шисти от Сакар – положение и петроложко значение

Philip Machev
Филип Мачев

Faculty of Geology and Geography, Sofia University “St. Kliment Ohridski”; E-mail: machev@gea.uni-sofia.bg

Key words: moissanite, mica schists, Sakar Mtn.

Introduction

Mineral moissanite was discovered by Henri Moissan in 1893 while examining rock samples from a meteor crater located in Canyon Diablo, Arizona. Firstly he mistakenly accepted that the mineral is diamond, but in 1904 he identified the crystals as silicon carbide. The mineral form of silicon carbide was named moissanite in honor of Moissan later on in his life. Until the 1950s no other source, apart from meteorites, had been encountered. Later moissanite was found in the Green River Formation in Wyoming in 1958 and as inclusion in kimberlite from a diamond mine in Yakutia in 1959. The existence of moissanite in nature was questioned even by Milton and Vitaliano (1984). Moissanite, in its natural form, is very rare. It has only been discovered in a small variety of places from upper mantle rocks to meteorites. Discoveries have shown that moissanite occurs naturally as inclusions in diamonds, xenoliths, and ultramafic rocks such as kimberlite and lamproite. At first time moissanite in Bulgaria was found by Gnoevaja and Grozdanov (1965) in carbonate rocks from NW Bulgaria. Close to Bulgaria moissanite was found in a cobble at a beach along the Turkish coast of the Mediterranean Sea, around 150 km NW from Izmir, and is most likely derived from Tertiary volcanic rocks outcropping in the area. The next outcrop is in Greece in zeolite-bearing volcanoclastic rocks (Filipidis, 1993). We find out this rare mineral in mica schists from the area of the village of Oreshnik, Sakar Mtn.

Petrology

The mica schists from this outcrop are well known as host rocks of big idioblastic staurolite crystals with typical cross-like twins. They belong to the Topolovgrad

metamorphic group with Triassic age. The rocks are small-grained with massive structure and big porphyroblasts of biotite (#Mg=54–58), chlorite (#Mg=59–61), garnet (with typical growth zonation without difference in the state of garnet – in the matrix, or included in staurolite), staurolite (#Mg=20–28) and ilmenite. The porphyroblasts float in fine-grained matrix of quartz and muscovite which flakes are partly oriented. The equilibrium mineral assemblage (Grt+Bt+MgChl+St) indicates of low temperature amphibolite facies of metamorphism without significant influence of stress pressure. The retrograde changes are negligible and they are presented by weak chloritization of biotite.

The moissanite crystals are found in xenolite like inclusions in the schists with dominantly sharp contacts with the host rocks. They are anhedral and building up by moissanite, quartz and biotite. The grains of moissanite and quartz are angular, rarely rounded, whereas the biotite flakes are idioblastic and often partly “included” in the xenolith. Microscopically the SiC crystals are bluish with slight pleochroism and very high relief. Because silicon carbide (moissanite) is a rare and discussable mineral we use a complex of physical methods for determination and investigation of the mineral. They include scanning electron microscopy, Raman spectroscopy and microprobe analysis. The aim of the study was not only to determine the moissanite crystals but to obtain information about the polymorph of moissanite, too. Typically moissanite was found in the nature as α -SiC (hexagonal) and β -SiC (cubic). The formation of both polymorphs is determined by temperature – α -SiC forms by 1900–2000 °C and β -SiC polymorph between 1200–1300 °C (Bauer et al., 1963). The Raman spectroscopy is powerful tool to identify SiC and to assess degree of lattice disorder. The Raman spectra of investigated samples show most common hexagonal polymorph (α -SiC or 6H.) Texturally moissanite crystals are commonly ho-

mogeneous but breakdown to quartz is observed too and the phase has heterogeneous composition. The origin of the established native Si in the xenolithic inclusions is probably related to breakdown of moissanite.

Conclusion

The observed inclusions probably represent pieces of former volcanic (?) rocks of mantle origin. They “fall”

in the Triassic sediments (age of the protolith) and metamorphosed later with the host rock. The stress-absent metamorphism allows them to preserve the original shape. The source province is still unknown.

Acknowledgments: The investigations were financially supported by Scientific Found of “St. Kliment Ohridski” University, Grand 009/2011 and SYNTHESYS Program – Project DE-TAF-763.

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