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## Raman study of diamonds crystallized in carbonate-carbon melts under high pressure

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Natural thermally modified graphite from Kumdykol diamond deposit (Northern Kazakhstan) was used as carbon source for high-pressure diamond synthesis in multi-component K-Na-Mg-Ca-Fe-carbonate-carbon melt at 8.0 GPa, 1800°C (run duration 20-30 min.). The carbonate melt serves as carbon solvent for the starting graphite. This study is focused onto analyzing products of the synthesis with the use of high resolution Raman spectroscopy.

High ordering with typical diamond line at 1332.7-1333.2 $cm^{-1}$ and FWHM around 3 $cm^{-1}$ is the characteristic property of the studied diamond crystals. Some additional Raman spectrum features at 1351, 1579-1587 $cm^{-1}$ connected with associated graphite phase were identified.

Three varieties of graphite material of different origin, probably, were disclosed. These are presented by (1) graphite syngenetic inclusions inside of diamond crystals, (2) large graphite aggregates formed later than diamond and (3) graphite surface occurrence over diamond faces.

The graphite included into diamond crystals is of special interest as indicative for conditions of diamond crystallization. The graphite inclusions of 0.5 – 5.0 μm size within the diamond matrix have a perfect sphere shape and are represented both independent inclusions and small-volume clusters of contacting individual inclusions of changeable shape. Raman data for syngenetic graphite inclusions are essentially different to that of graphite surface occurrence. It is proposed that the surface graphite is product of tiny diamond graphitization but the included graphite was formed by growth mechanism and cannot relate to the process of graphitization.

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