

## MINERALOGY OF MICRODIAMONDS FROM METAMORPHIC ROCKS AND CONDITIONS OF THEIR FORMATION

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The problem of diamond formation connected with metamorphic rocks is attracting numerous investigators. This type of diamond occurrences can provide the huge mass of diamonds like Popigaisky and Kumdy-Kol ones. The majority of publications in this direction are devoted preferably to petrography of HPHT rocks and inclusions. We have tried to systemize knowledge about metamorphic diamonds finds and provided investigations of metamorphic diamonds structural and physical properties features, mineralogy of carbon systems at the occurrences (SHUMILOVA, 2003).

According to geological settings and typomorphic features of metamorphic diamonds we have established that among metamorphic diamond bearing objects three types of diamonds exist: 1- impactly metamorphosed (formed by shock HPHT influence); 2- regional metamorphic (formed at static HPHT); 3- metasomatic (formed with fluid phase at quite low PT-conditions). As for the first type, the mechanism of diamond formation is known exactly, it is a solid transformation by martensite transition.

The situation with the regional diamond type is not so simple. According to modern experimental data on diamond synthesis the static solid transition graphite–diamond (direct transition) can be possible only at pressure higher then 8 GPa and temperature – more then 1400 °C. It means that the regional metamorphic type of diamonds could be possible at the same ultra high P-T conditions. It is important to know that the limits of pressure and temperature used before by geologists were automatically accepted from another experimental diamond formation mechanism – crystallization through dissolved carbon of metal melts, which allows to produce diamond at essentially lower pressure – 4 GPa. Thus, the geological metamorphism conditions earlier used are not quite correct as they were taken from another mechanism. The right P-T conditions could be provided not only with lithostatic pressure but with tectonic processes on grains boundaries level. We have established presence of cubic modification of graphite within granulites of Kola peninsula, the cubic graphite can be formed by transition mechanism within the pressure limit 15 - 30 GPa (SHUMILOVA, 2003). It means that UHPT-conditions could be possible not only at huge depths.

The geological features of the metasomatic diamond type were described by LAVROVA et al. (1999) in detail. The geology says rather about fluid diamond formation that accords to our mineralogical investigations of Kumdy-Kol diamonds and graphite.

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### References

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