

THE TIMING OF PARTIAL MELTING AND UHP METAMORPHISM IN THE KUMDY-KOL REGION (KOKCHETAV MASSIF, NORTHERN KAZAKHSTAN)

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The Kokchetav Massif is the type locality of microdiamonds in metamorphic rocks of the Earth's crust (SOBOLEV & SHATSKY, 1990). Drilling data indicate that diamondiferous rocks in the Kumdy-Kol microdiamond deposit are interlayered with granite gneisses, and migmatized garnet-biotite gneisses. It could be supposed that some part of granite gneisses and migmatite have been formed on melting of diamondiferous rocks. High equilibrium temperatures and geochemical data of diamondiferous rocks suggest their partial melting.

To determine the age of partial melting and relationship between the UHP rocks and migmatite five samples were collected for geochronology with precise locations in an underground mining gallery of Kumdy-Kol microdiamond deposit. They are related both to diamond-free zone and diamond-bearing zone. Studied rocks were affected by partial melting and preserve migmatitic structures. UHP indicator minerals are not preserved in these rocks; migmatization has destroyed almost completely previous mineral assemblages. Samples of rocks were crushed and the heavy mineral fraction including zircon was extracted using routine techniques, and zircon grains were hand picked from concentrate. Zircon was analysed for U, Th and Pb using the Sensitive High-Resolution Ion-Microprobe Reverse Geometry (SHRIMP RG) at Stanford-USGS Micro Analytical Center.

The internal structures of near central zircon parts revealed by cathodoluminescence and secondary electron microscopy mainly consist of core and rim domains. The apparent ²⁰⁶Pb/²³⁸U age for core domains (524 ± 6 Ma) and rim domains of zircons (522 ± 7 Ma) are the same within analytical error. The mean age of all zircons is 523 ± 4 Ma. Migmatites ages are slightly younger than the U-Pb zircon ages of metamorphic peak (~530–537 Ma) (CLAOUE-LONG et al., 1991, HERMANN et al., 2001). These data indicate that the partial melting took place during exhumation of diamondiferous rocks from the UHP peak to amphibolite-facies conditions.

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