

**METASTABLE UHPM GRAPHITE AND METAMORPHIC DIAMOND
FROM THE KOKCHETAV ROCKS (NORTHERN KAZAKHSTAN)**

KORSAKOV, A. V.¹, ZEDGENIZOV, D. A.¹, VANDENABEELE, P.²,
SUZUKI, A.³, KAGI, H.⁴ & HUTSEBAUT, D.²

¹Institute of Mineralogy and Petrography SB RAS, Koptyug Pr. 3, 630090, Novosibirsk, Russia

²Ghent University, Department of Analytical Chemistry Raman Research Group, Proeftuinstraat 86, B-9000 Ghent, Belgium

³Institute of Mineralogy, Petrology & Economic Geology, Fac. of Sci., Tohoku Univ., Sendai 980-8578, Japan

⁴Laboratory for Earthquake Chemistry, Graduate School of Science, Univ. of Tokyo, Tokyo 113-0033, Japan
e-mail: korsakov@uiggm.nsc.ru

Coexistence of graphite and diamond in the crustal-derived metamorphic rocks from the Kokchetav massif (northern Kazakhstan) was first interpreted in favour of their metastable origin (DOBRZHINETSKAYA et al., 1994). The abundance of ultrahigh-pressure (UHP) metamorphic relics in the diamond-bearing rocks of the Kokchetav massif (SOBOLEV & SHATSKY, 1990; SHATSKY et al., 1995) supports the UHP metamorphic origin of the diamond. Despite the lack of evidence, the occurrence of graphite in UHPM rocks is commonly explained by graphite formation during retrograde stage in diamond-bearing rocks (MASSONNE et al., 1998; ZHU & OGASAWARA, 2002). Graphite inclusions in and graphite coatings around microdiamonds from the Kokchetav massif are investigated with confocal Raman spectroscopy using the in situ point-by-point mapping technique. The lack of disordered carbon in the core of graphite inclusions testifies that graphite represents the co-genetic inclusions in diamond rather than have been formed through the solid stage diamond-graphite transformation. Based on these data and the experiments in carbonate-carbon and COH systems showed that contemporary crystallization of both polymorphs of carbon may occur in the diamond stability field, the presence of the graphite either as inclusions in diamond or as a coatings around diamond crystals is not proving for their formation during retrograde stage of UHP metamorphism.

This work was supported by Russian Foundation for Basic Research (No.04-05-64360, No.03-05-64040), MK-1041.2004.5 and Russian Science Support Foundation.

References

- DOBRZHINETSKAYA, L.F., BRAUN, T.V. SHESHKEL, G.G. & PODKUIKO, Y.A., (1994): *Tectonophysics*, 233, 293–313.
- SOBOLEV, N.V. & SHATSKY, V.S. (1990): *Nature*, 343, 742–746.
- SHATSKY, V.S., SOBOLEV, N.V. & VAVILOV, M.A. (1995): *Diamond-bearing metamorphic rocks from Kokchetav massif (Northern Kazakhstan)*. - In: *Ultrahigh Pressure Metamorphism: Cambridge Univ. Press*, p. 427-455.
- MASSONNE, H.-J. (2003): *Earth and Planetary Science Letters*, 216, 347–364.
- MASSONNE H.-J., BERNHARDT H.J., DETTMAR D., KESSLER E., MEDENBACH O. & WESTPHAL T (1998): *European Journal of Mineralogy*, 10, 497-504.
- ZHU, Y.F. & OGASAWARA, Y. (2002): *Geology*, 30, 947-950.