A NEW TYPE OF IMPACT DIAMONDS: DIAMOND PARAMORPHS AFTER WOOD RELICS.

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Impact diamonds are known as high quality technical material [1]. Usually they are formed by graphite-to-diamond solid-phase diffuse-less transition at shock pressures > 30 GPa. The diffuse-less mechanism had been proven by numerous experimental studies [2]. But impact diamond formation is possible from non-graphitic precursor too, from amorphous carbons and bitumenes, while the process is rare known and slightly studied. In the nature not only graphite of metamorphic rocks but sedimentary organic matter containing rocks can be treated by impact processes resulting by high pressure phases up to after-coal diamond formation [3]. The only two astroblemes with after-coal diamonds have been found by present – the giant Kara and Ust`-Kara astroblemes with 65 and 25 km in diameters correspondently [1, 3]. The novel data on impact diamonds and impact objects are very actual since the practical interest to impact diamonds last time is rising [4, 5].

Here we present the after-coal diamonds features including a new impact diamond variety (Fig. 1) presented by after-organics diamond paramorphs first time found at the Kara astrobleme (Pay-Khoy, Russia) [6]. The paramorphs are characterized with perfectly preserved micromorphology of the wood relics being composed of pure carbon content with polynanocrystalline structure has been proven with Raman spectroscopy, transmission electron microscopy, atomic force microscopy and other modern methods. The received data on after-coal diamonds point to their formation by low-distance diffuse mechanism described for low ordered carbons by Borimchuk et al. [7].

The received data allow to present a new impact diamond variety widely spread through the Kara astrobleme counting huge concentrations – up to several thousand carat per ton [6]. The proposed novel mechanism of impact diamonds formation is characterized with several stages including high pressure high temperature fast pyrolysis with the precursor carbonization co-followed with diamond crystallization through low-distance diffuse mechanism [6]. The provided study allow suppose possibility of wide distribution of impact diamonds formed after noncrystalline carbons and organics of sedimentary objects at large impact craters around the world.

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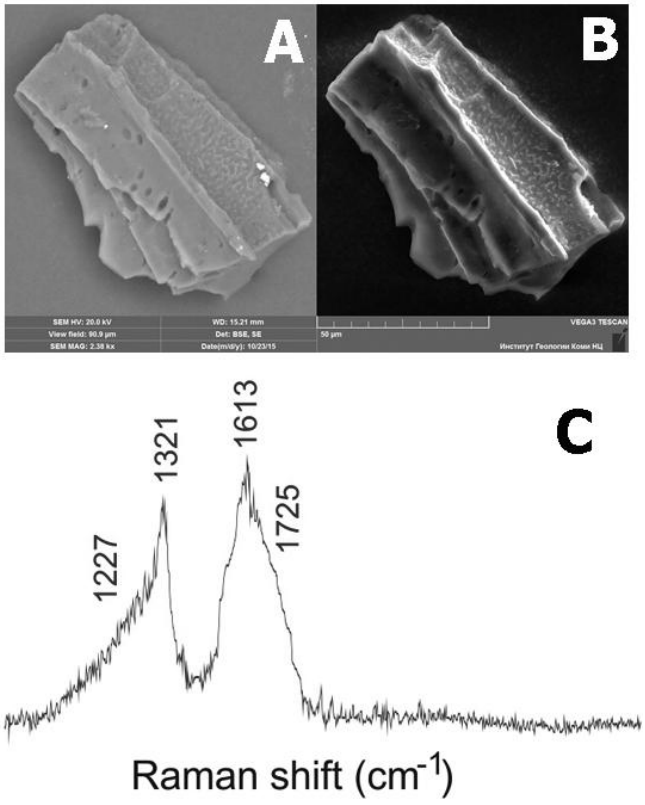

Fig. 1. SEM images of the diamond paramorph after wood relic with the preserved organic micromorphology, A – reflected electron mode, B – secondary electron mode; C – UV Raman spectrum of the particle.

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