

## Strain Distribution in Synthesized Diamonds

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The complex of experimental methods (electron backscattering diffraction, X-ray microanalysis, X-ray topography) was used for determination of local strain distributions in diamond crystals synthesized in different growth systems: by a temperature-gradient method in a Fe–Al–C system (first sample), and diamond film Mg–C + B grown on diamond single crystal of Ni–Mn–C system (second sample). EBSD patterns (Kikuchi patterns) were obtained by using of scanning electron microscope "Zeiss" Evo-50 with CCD detector.

A new ways for determination of planar distribution of local strains in crystal from Kikuchi patterns were proposed including histogram method and method of direct two-dimensional Fourier transformation. Relationships between changes of fine structure of two-beam Kikuchi lines and multi-beam areas and crystal imperfections were established [1]. It gave possibility to determine strains in local areas of samples.

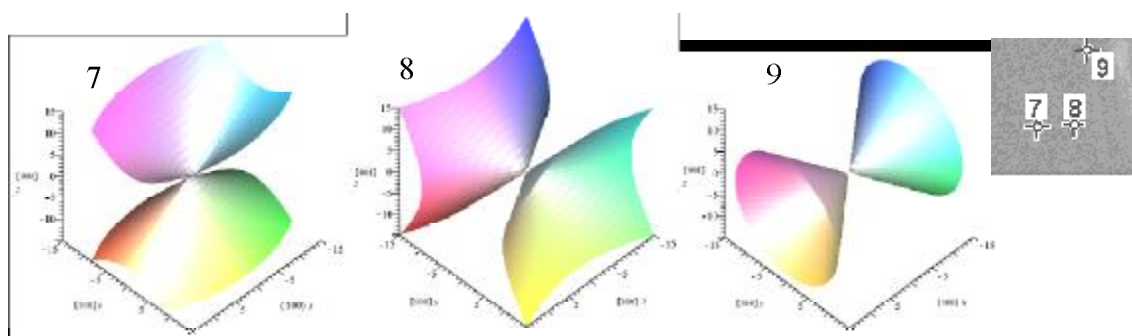


Fig. 1. Characteristic surfaces of strain tensor (a), which correspond to different local areas 7, 8, 9 of diamond crystal (b)

The researches of displacements of Kikuchi-band intersections and changes of integral intensity along crosssection of Kikuchi band allowed to determine the strains in  $[\bar{4}00]$ ,  $[\bar{1}11]$  and  $[022]$  directions for a local areas of synthesized diamond crystals. It is shown that  $(\bar{1}11)$  planes are the most strained and  $(\bar{4}00)$  planes are the less strained for the first sample. The second sample revealed the increase of strains in all directions, especially in  $[022]$  direction.

1. Borchha M.D. Local strains in diamond crystals determined by Fourier-transformation of Kikuchi patterns / M.D. Borchha, S.V. Balovsyak, I.M.Fodchuk, V.Yu.Khomenko, O.P.Kroitor, V.N. Tkach // Journal of Superhard Materials. – 2013. – Vol.35, Issue 5. – P. 220-226.