

Definition of structural elements of diamond powders and polycrystals sintered from them

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Coherent scattering region (CSR) is the certain field coherently diffusing impinging radiation. It is determined by the broadening of the lines on X-ray spectrums at examination of the disperse structures or powders. Some researchers use CSR values as the sizes of material grains which are explored.

In the table the grain sizes of diamond nanopowders, the sizes of crystal grains in the polycrystals sintered from them, spotted by means of electronic microscopy, and also the corresponding CSR sizes are given. The diffraction spectrums, on which analysis CSR of X-rays is carried out, were gained on diffractometer DRON 3. Definition of the sizes of particles and crystal grains has been spent by a method of transmission electron microscopy in a combination to a microdiffraction. For powder examination its test was located on a carbon substrate. Studying of polycrystals was conducted on a thin foil of the polycrystalline samples gained by a ionic thinning method.

Table.

Specimen	Particle size, crystallite size, nm	CSR, nm
Source powder ASM 0,1/0	50–100	20,6
Polycrystal sintered from ASM 0,1/0	10–50	4,2
Polycrystal sintered from UDD	3–15	3,9
Source powder UDD	2–3	4,8

Apparently from the table, reduction of the particle sizes of diamond nanopowders conducts to reduction CSR. At the same time, integration of crystal grains in diamond polycrystals is not reflected in the sizes CSR. Probably it occurs because the enlarged diamond crystals grains become fragmented. Herefore it is possible to tell that CSR data and electronic microscopy data give the complementary information about structure of diamond materials.