# Polycrystalline diamond fibres prepared by high temperature shock compression of the multi-walled carbon nanotube

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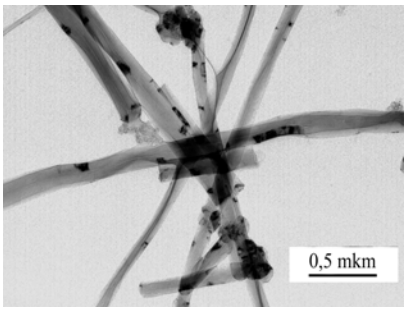
The high temperature shock compression (HTSC) method based on detonation treatment of the powder mixtures consisting of a substance investigated and some additives which possess higher compressibility and lower specific heat [1]. Such additives can be, for example, alkaline-haloid salts. Owing such properties mentioned additives provide the intensive heating of a basic substance during compression and sharp cooling during unloading, preventing thus reverse transformation.

In this work polycrystalline diamond fibers of 150-200 nm diameter have been produced by HTSC method [2]. The initial product was the multi-walled carbon nanotubes (fig. 1,2) A pressure of the process was estimated as 30 GPa and the temperature as 3500 K.



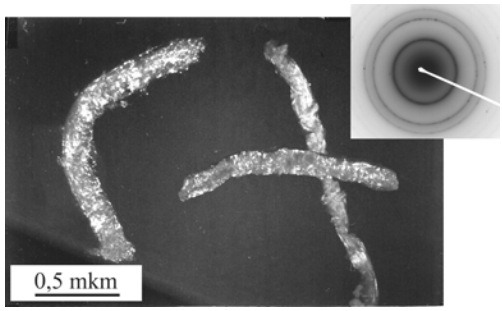




**Figure 1.** The multi-walled carbon nanotubes **Figure 2.** The polycrystalline diamond fibers

The study of the transformation products with the X-ray and electron microscopy methods revealed that the treated fibers consist of fine diamond particles with size about 10 nm and arbitrary orientation.

The preservation of the multi-walled carbon nanotubes morphology after their transformation into diamond caused by presence of the KCl additive softening the action of shock waves, especially when the additive melts at high temperature.

[1] Britun V.F., Kurdyumov A., Borimchuk N.I. et al., *Diam.Rel. Mater.* **16**(2), 267 (2007).
[2] V.F.Britun, A.V.Kurdyumov, Yu.M.Solonin, V.V.Yarosh, *Report of the National Academy of Science of Ukraine* 11, 86-90 (2009).