Features of carbon nanotube based ceramics compounding on silicon dioxide

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The unique properties of carbon nanotubes, such as their strength and chemical resistance [1] causes the interest to use them as an additive to various materials for the production of composites. In carbon nanotubes obtained from ethanol [2] precursor $[Ni(NH_3)_6]Cl_2$ at 600 °C. As a model of ceramics in a quartz ceramics obtained by hydrolysis of tetraethoxysilane. The structure of such a ceramic nanoballs are amorphous SiO_2 with carbon nanotubes.

When equal amounts of matter absolutely different volumes of material. It should be noted that the density of the resulting ceramic on carbon nanotubes less than without nanotubes (or carbon nanotubes grown in the pores). This loss of density is determined by adding the carbon nanotubes in the synthesis of ceramics and due to the fact that carbon nanotubes, having a high surface area, lower free energy of formation of ceramics on the surface. Thus, they are the catalyst for the ceramics. Hardness of ceramic composites clearly indicate hardening of ceramics obtained on carbon nanotubes, compared to the original, at the same time the process of growth of carbon nanotubes reduced the strength of carbon nanotubes. A significant increase in the hardness of ceramics grown on carbon nanotubes due to more dense structure of original ceramic grain, which was created by the matrix of carbon nanotubes. Reducing the hardness of ceramics with grown carbon nanotubes compared to the original strains can be explained in ceramics arise in the growth of carbon nanotubes.

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[2] I. Bobrinetskii, V. Nevolin, M. Simunin, Theor. Found. Chem. Eng. 41(5) (2007) 639–643.