Nanocomposites and nanomaterials

Diameter distribution of carbon nanotubes under conditions of volume diffusion

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Analysis of experimentally obtained size distribution functions in the form of percentage of carbon nanotubes *vs* diameters of them shows increasing intermediate tube diameters with increasing concentration of the source of carbon atoms [1]. The mechanism of growth is associated with the Ostwald's ripening carbon nanotubes considered as a massive of cylindrical nanoclusters of various diameters and heights, embedded in volume solution of carbon atoms [2]. Interaction of nanoclusters is realized through the Gibbs-Thomson effect resulting in increasing their average diameters. Validity of the proposed mechanism of increasing average diameters of nanotubes is proved by comparison of the experimentally obtained histograms with theoretically computed dependences [2]. We use the generalized Lifshitz-Slyozow-Wagner distribution [3] computed in assumption that growth of nanoclusters (nanotubes) is controlled simultaneously both by volume diffusion and by speed of chemical connections' formation, or by chemical reaction (the Wagner's mechanism of growth). Under specified technological parameters and conditions of synthesis, the obtained theoretically distribution well fit the experimental histograms for single-layer carbon nanotubes.

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