CARBON NANOWALLS SYNTHESIS IN THE PLASMA OF A RADIO-FREQUENCY DISCHARGE

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Carbon nanowalls (CNWs) are two-dimensional carbon nanostructures with vertically oriented graphene sheets, which have a well-developed surface and high specific density. Due to the specific structure, they have interesting physical and chemical properties and potential application for the creation of electronic device components, black body like material, etc. [3], [1], [2]. In our previous work [4], [5], [6], devoted to the study of CNWs synthesis in the plasma of RF discharge, it was found that an increase in the discharge power caused agglomeration of nanowalls into nanoclusters with the formation of defects in the structure. In the present work, we developed a process map of the formation of carbon nanomaterials (including CNWs) depending on synthesis parameters. The CNWs were obtained at different values of RF power and it was found that increasing RF power caused a decrease in the height of CNWs and an increase in their thickness. The optimal conditions of methane flow rate, RF power, and growth time were determined for the synthesis of high-quality CNWs. The obtained samples were analyzed by using a Quanta 3D 200i scanning electron microscopy (SEM, the FEI company, USA), NtegraTherma atomic force microscopy (AFM), and Ntegra SPECTRA Raman spectroscopy. According to the SEM, Raman, and AFM analysis, a process map was developed to chart the zones of CNWs formation with high structural quality.

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