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EFFECT OF PLASMA PARAMETERS ON THE SYNTHESIS OF CARBON NANOMATERIALS BY THE PECVD METHOD

Abstract: This work covers an experimental study of the effect of plasma parameters on the synthesis of carbon materials by the PECVD method. It was found that, depending on PECVD synthesis parameters in particular, temperature, discharge power, gas pressure, percentage of gas mixture and etc., a various carbon nanomaterials are synthesized. The obtained samples were analyzed by using of analytical equipment such as Quanta 3D scanning electron microscope (SEM, FEI USA), NThegra Spectra Raman spectroscopy and Leica optical microscope. Thus, the morphology and quality of the structure of the obtained samples (carbon nanoparticles (CNP), carbon nanofibres (CNF) and nanotubes (CNTs), carbon nanowalls (CNWs) and multilayered graphene sheets) were studied by optical and electron microscopies, as well as by the method of combined light scattering. Found, that with the increase of power of the radio-frequency discharge, the production of qualitative nanostructures is complicated by formation of their nanoclusters. For the synthesis of CNT, it is necessary to control the thickness of catalytic nanolayer, since the quality of CNT structures can be worsened by the formation of thicker nanofibers. The obtained experimental results can be used to determine the optimum PECVD synthesis condition to synthesize various carbon nanomaterials.

Keywords:carbon nanoparticles, carbon nanofibers, carbon nanotubes, carbon nanowalls, multilayer graphene, radio-frequency (RF) discharge plasma.

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ВЛИЯНИЕ ПАРАМЕТРОВ ПЛАЗМЫ НА СИНТЕЗ УГЛЕРОДНЫХ НАНОМАТЕРИАЛОВ МЕТОДОМ PECVD

Аннотация. Данная работа посвящена экспериментальному исследованию влияния параметров плазмы на синтез углеродных материалов методом PECVD. Установлено, что в зависимости от параметров PECVD синтеза в частности, температуры, мощности разряда, давление газа, процентное соотношение смеси газов и