



CARBON NANOTUBES AND NANOFIBERS SYNTHESIS BY CHEMICAL VAPOR DEPOSITION IN REACTOR WITH CLOSE GAP BETWEEN CATALYTIC WALLS

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ABSTRACT

Carbon nanotubes and nanofibers have been grown by thermal CVD inside slit-like space between Ni-coated walls of plane flowing reactor. No additional plasma excitation and no other catalyst were used. It is shown much greater efficiency of CVD-process in plane reactor as compared with traditional tubular reactor. Extremely high hydrocarbon feedstock conversion and the yield of nanostructured carbon is achieved in case of plane reactor.

Theoretical estimate of gas dynamics and diffusion flow is implemented for tubular and plane configuration of CVD-reactor. Approximate relationship is found between reactor dimensions and physical parameters such as temperature, pressure, flow rate, chemical composition and properties of working gas mixture. It allows defining a simple criterion when plane geometry of CVD-reactor is more effective than tubular one under the same conditions. This theoretical analysis reveals that slit-like reactor configuration is more suitable for large-scale carbon nanotubes production as compared with tubular reactor.

Keywords: thermal CVD, carbon nanotubes, plane reactor, gas dynamics, diffusion