

Nanocomposites and nanomaterials

Pitch coke as a feedstock for synthesis of carbon nanotubes

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In an effort to obtain carbon nanotubes (CNTs), methods for the synthesis of carbon nanostructures (CNS) were proposed and developed. The arc discharge is one of the best methods for the production of high quality CNTs. Such parameters as the type of the carbon raw material, the catalyst, the reactor atmosphere and temperature have an effect on the mechanism of growth, the yield and the diameter of the CNTs in the arc discharge reactor. The most important parameter for the synthesis of carbon nanostructures, which can help increase the yield of CNTs, is the selection of the carbon raw material.

We have suggested using pitch coke to produce carbon nanotubes by the arc discharge process. The use of pitch coke is justified on account of the high carbon content and the presence of cross-links in the structure, those cross-links being strong enough at an anode annealing temperature of 900 °C but being unable to withstand extremely high temperatures that occur under the arc discharge conditions. As a result, a large amount of bigger carbon fragments is released, and those fragments are easily incorporated into the structure of the nanosized carbon particles by means of a catalyst.

The use of pitch coke in the arc discharge process has resulted in obtaining carbon nanotubes with a diameter of 30 nm (Fig.).

Fig. – SEM picture of carbon nanotubes from pitch coke