

A study on the effect of calcination temperature on the graphitization of carbon nanotubes synthesized by the decomposition of methane

Abstract

The effect of calcination temperature for $\text{Fe}_2\text{O}_3/\text{MgO}$ catalysts on the formation of carbon nanotubes (CNTs) was examined. CNTs were synthesized over $\text{Fe}_2\text{O}_3/\text{MgO}$ catalysts calcined at different temperatures by catalytic decomposition of methane at 1000°C . The synthesized CNTs were investigated by a combination of scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD) and Raman spectroscopy. The results show that the effect of calcination temperatures greatly governed the diameter and the quality of the SWCNTs formed. The catalysts calcined at 500, 600 and 700°C produced CNTs with the diameters of 1.53, 1.95 and 2.97nm, respectively. Generally, an increase in the calcination temperature increases the average diameter and decreases the quality of the CNTs produced.

Keywords; Chemical Vapor Deposition (CVD), Electron Microscopy, Nanostructure, Raman Scattering, Raman Spectroscopy