

Multiple-wall carbon nanotubes obtained with mesoporous material decorated with ceria-zirconia

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Abstract

In this work, Ceria-Zirconia on ordered Santa Barbara mesoporous silica (Ce-Zr-SBA-15), has been used directly as a catalyst for the synthesis of carbon nanotubes (CNTs) through Chemical Vapor Deposition (CVD). In addition to cerium oxide, it contains zirconium oxide nano crystallites, which act as catalysts for carbon nanostructures. The catalytic performance of this material was evaluated for the decomposition of ethanol at 900 °C, with N₂ flow. The carbon decomposed from absolute ethanol diffuses through the surface of the nanostructured catalytic material and precipitates in the form of MWCNT structures, which could be identified by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), showing average diameters of 30–35 nm.

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MULTIPLE-WALL CARBON NANOTUBES OBTAINED WITH MESOPOROUS MATERIAL DECORATED WITH CERIA-ZIRCONIA

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Keywords: Carbon Nanotubes; CVD; Synthesis; Characterization; Ce-Zr-SBA-15; Catalyst

ABSTRACT

In this work, Ceria-Zirconia on ordered Santa Barbara mesoporous silica (Ce-Zr-SBA-15), has been used directly as a catalyst for the synthesis of carbon nanotubes (CNTs) through Chemical Vapor Deposition (CVD). In addition to cerium oxide, it contains zirconium oxide nano crystallites, which act as catalysts for carbon nanostructures. The catalytic performance of this material was evaluated for the decomposition of ethanol at 900 °C, with N₂ flow. The carbon decomposed from absolute ethanol diffuses through the surface of the nanostructured catalytic material and precipitates in the form of MWCNT structures, which could be identified by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), showing average diameters of 30-35 nm.

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