

Effect of the reaction temperature and ethene/hydrogen composition on the nanostructured carbon produced by CVD using supported NiFe₂O₄ as a catalyst

ABSTRACT

The carbon nanostructures (CNS) were successfully grown during the chemical vapour deposition of ethene (C₂H₄) and hydrogen (H₂) over a supported Ni_{0.362}Fe_{0.64} catalyst. The temperature of the reaction was varied between 400 °C and 700 °C with different ratios of hydrogen and ethene (20/80, 50/50 and 80/20). The increase of the H₂ in the reaction gas gives higher deposition yield of carbon where the maximum yield is observed at a mixture of 50/50 of H₂ and C₂H₄ respectively. The results showed that the structures of the carbon formed by the decomposition of ethene were dependent on the reaction temperature and the gas ratio employed. Graphitic nanofibers (GNFs) and multiwall carbon nanotubes (MWCNTs) were produced when the temperature reached 700 °C, while at the lower temperature 600 °C, disordered CNS with encapsulation and some amorphous nanostructures tended to form.

Keyword: Carbon nanostructures; NiFe₂O₄ catalyst; CNTs