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Investigating the effect of a zeolite and CaCO₃ catalyst support on the production of carbon nanotubes

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Carbon nanotubes (CNTs) are a widely researched field of study due to their vast applications such as drug delivery in medical field and membrane separation technology. Numerous techniques have been used for their synthesis but the chemical vapor deposition (CVD) being most economic technique at low temperature and ambient pressure. This work investigates the effect of the catalyst support such as zeolite and CaCO₃ on the synthesis of CNTs. The wet impregnation method was successfully used to prepare Fe-Co catalyst on both supports. The CVD was used to produce carbon nanotubes from acetylene (carbon source) at 700°C. The CNTs produced had differing diameters, with CNTs grown on the zeolite supported catalysts having smaller diameters ranging from 10 to 50 nm while that grown on the CaCO₃ support had larger diameters ranging from 20 to 80 nm. The yield of nanotubes produced with Fe-Co catalyst on CaCO₃ was almost twice as much as the one produced with Fe-Co catalyst on zeolite. The structure of the support and support-catalyst agreed with SEM images, XRD spectra's and EDS. TEM, Raman, FTIR and TGA results confirmed the structure of the synthesized CNTs. The diameter's size of CNTs influences the usage of CNTs such as the loading amount of anticancer drugs in drug delivery.

Biography

D B Nkazi is a Lecturer at the University of the Witwatersrand, Johannesburg – South Africa. PhD (Chemical Eng./University of the Witwatersrand), MSc (Polymer Chemistry, University of the Witwatersrand) and BSc Eng. (University of Lubumbashi/ Dem. Rep. of Congo).

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