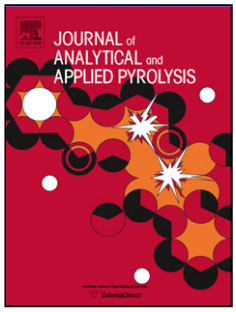

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Comparative study on the performance of carbon nanotubes prepared from agro- and xerogels as carbon supports

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Highlights

- Agro versus synthetic polymer, as carbon support, in synthesizing high surface area carbon nanotubes (CNTs).
- Role of aldehyde chain-based xerogel, on its performance as carbon support in production CNT.
- Tri-metallic catalysts (Fe/Ni/Cu) and camphor as carbon source outperformed the xerogel performance in CNT production, as well as allowed obtaining highly mesoporous CNTs.
- Adsorption behavior of synthesized CNTs toward methylene blue and iodine was studied, for further application in wastewater treatment.

Abstract

The role of natural and synthetic polymers on performance of the prepared carbon nanotubes (CNTs) is compared. In this respect rice straw (RS) and organic xerogels (OXG) are used as carbon supports; while camphor and tri-metal oxides (Fe-Ni-Cu) are performed as carbon precursor and catalyst to produce CNTs. Two chain length aldehydes (formaldehyde and butyraldehyde) are used in preparing OXG from their reaction with resorcinol. The evaluation of CNTs is carried out by SEM, TEM and FT-IR, as well as adsorption performance (e.g., nitrogen gas, iodine value and methylene blue adsorption capacity). The results show that, the xerogels prepared from two aliphatic aldehydes are more efficient as carbon supporting materials of CNTs than RS, where they provide yields of CNTs over the carbonized xerogels varying from 85 to 320 % (based on starting weight of support carbon + catalyst);; while the yield becomes 20% in case of rice straw (RS) carbon support. Moreover, the produced CNTs from xerogels possess