Waste NR latex based-precursors as carbon source for CNTs eco-fabrications

ABSTRACT

In this work, the potential of utilizing a waste latex-based precursor (i.e., natural rubber glove (NRG)) as a carbon source for carbon nanotube (CNT) fabrication via chemical vapor deposition has been demonstrated. Gas chromatography-mass spectroscopy (GC-MS) analysis reveals that the separation of the lightweight hydrocarbon chain from the heavier long chain differs in hydrocarbon contents in the NRG fraction (NRG-L). Both solid NRG (NRG-S) and NRG-L samples contain >63% carbon, <0.6% sulfur and <0.08% nitrogen content, respectively, as per carbon-nitrogen-sulfur (CNS) analysis. Growth of CNTs on the samples was confirmed by Raman spectra, SEM and TEM images, whereby it was shown that NRG-S is better than NRG-L in terms of synthesized CNTs yield percentage with similar quality. The optimum vaporization and reaction temperatures were 350 and 800 °C, respectively, considering the balance of good yield percentage (26.7%) and quality of CNTs (ID/IG = 0.84 ± 0.08, diameter ≈ 122 nm) produced. Thus, utilization of waste NRG as a candidate for carbon feedstock to produce value-added CNTs products could be a significant approach for eco-technology.