Production of green diesel from catalytic deoxygenation of chicken fat oil over a series binary metal oxide-supported MWCNTs

ABSTRACT

Deoxygenation processes that exploit milder reaction conditions under H_2-free atmospheres appear environmentally and economically effective for the production of green diesel. Herein, green diesel was produced by catalytic deoxygenation of chicken fat oil (CFO) over oxides of binary metal pairs (Ni–Mg, Ni–Mn, Ni–Cu, Ni–Ce) supported on multi-walled carbon nanotubes (MWCNTs). The presence of Mg and Mn with Ni afforded greater deoxygenation activity, with hydrocarbon yields of >75% and *n*-(C_{15} + C_{17}) selectivity of >81%, indicating that decarboxylation/decarbonylation (deCOx) of CFO is favoured by the existence of high amount of lower strength strong acidic sites along with noticeable strongly basic sites. Based on a series of studies of different Mg and Mn dosages (5–20 wt%), the oxygen free-rich diesel-range hydrocarbons produced efficiently by Ni_{10}–Mg_{15}/MWCNT and Ni_{10}–Mn_5/MWCNT catalysts yielded >84% of hydrocarbons, with *n*-(C_{15} + C_{17}) selectivity of >85%. The heating value of the green diesel obtained complied with the ultra-low sulphur diesel standard.