

## **Free-H<sub>2</sub> deoxygenation of Jatropha curcas oil into cleaner diesel-grade biofuel over coconut residue-derived activated carbon catalyst**

### **ABSTRACT**

Diesel-like hydrocarbons were produced by the catalytic deoxygenation (DO) of Jatropha curcas oil (JCO) over novel Agx/AC and Niy-Agx/AC catalysts under an H<sub>2</sub>-free atmosphere. The AC was synthesized from coconut fibre residues (CFR), where CFR is the by-product from coconut milk extraction and is particularly rich in soft fibres with high mineral content. The Niy-Agx/AC catalyst afforded higher DO activity via the decarboxylation/decarbonylation (deCO<sub>x</sub>) route than Agx/AC due to the properties of Ni, synergistic interaction of Ni and Ag species, adequate amount of strong acid sites and large number of weak acid sites, which cause extensive C-O cleavage and lead to rich formation of n-(C<sub>15</sub>+C<sub>17</sub>) hydrocarbons. The effect of Ag and Ni content were studied within the 5 to 15 wt% range. An optimum Ni and Ag metal content (5 wt%) for deCO<sub>x</sub> reaction was observed. Excess Ni is not preferable due to a tendency for cracking and Ag-rich containing catalyst weakly enforced triglycerides breaking. The Ni<sub>5</sub>-Ag<sub>5</sub>/AC govern exclusively decarbonylation reaction, which corroborates the presence of Ni<sup>2+</sup> species and a high amount of strong acid sites. Ultimately, Ni<sub>5</sub>-Ag<sub>5</sub>/AC in the present study shows excellent chemical stability with consistent five reusability without drastic reduction of hydrocarbon yield (78–95%) and n-(C<sub>15</sub>+C<sub>17</sub>) selectivity (82–83%), which indicate favourable application in JCO DO.

**Keyword:** Ag<sub>2</sub>O; Carbon; Deoxygenation; Decarboxylation/decarbonylation; NiO