**Pyrolytic–deoxygenation of triglyceride via natural waste shell derived Ca(OH)$_2$ nanocatalyst**

**ABSTRACT**

Cracking–Deoxygenation process is one of the important reaction pathways for the production of biofuel with desirable $n$-C$_{17}$ hydrocarbon chain via removal of oxygen compounds. Calcium-based catalyst has attracted much attention in deoxygenation process due to its relatively high capacity in removing oxygenated compounds in the form of CO$_2$ and CO under decarboxylation and decarbonylation reaction, respectively. In the present study, deoxygenation of triolein was investigated using Ca(OH)$_2$ nanocatalyst derived from low cost natural waste shells. The Ca(OH)$_2$ nanocatalyst was prepared via integration techniques between surfactant treatment (anionic and non-ionic) and wet sonochemical effect. Results showed that sonochemically assisted surfactant treatment has successfully enhanced the physicochemical properties of Ca(OH)$_2$ nanocatalyst in terms of nano-particle sizes ($\sim$50 nm), high surface area ($\sim$130 m$^2$ g$^{-1}$), large porosity ($\sim$18.6 nm) and strong basic strength. The presence of superior properties from surfactant treated Ca(OH)$_2$ nanocatalysts rendered high deoxygenation degree, which are capable of producing high alkane and alkene selectivity in chain length of $n$-C$_{17}$ (high value of $C_{17}/(n$-$C_{17}+n$-$C_{18}$) ratio = 0.88). Furthermore, both Ca(OH)$_2$–EG and Ca(OH)$_2$–CTAB nanocatalysts showed high reactivity with 47.37% and 44.50%, respectively in total liquid hydrocarbon content of triolein conversion with high H/C and low O/C ratio.

**Keyword:** Cracking; Decarboxylation–decarbonylation; Calcium oxide; Clamshell; Hydrocarbon