Fatty acid as a platform for renewable fuels and chemicals via H_2-least approaches

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High yield of hydrocarbons is generally obtained from deoxygenation of fatty acid since the feed possesses higher C/O ratio, as compared to the other bio-derived feedstocks. As fatty acid strongly adsorbs on the catalyst surface, high H_2/feed ratio is typically employed to prevent deactivation. Such reaction condition leads to a successive hydrogenation that essentially yields low-value paraffinic hydrocarbons as products. The H_2-least approaches for deoxygenation of fatty acid are hence discussed in this talk. This involves (i) selective cracking of the carboxylic-end to produce long chain olefins, and (ii) conversion of the fatty acid, primarily to aldehyde or ketone, from which the olefinic hydrocarbons can be also produced via hydrodeoxygenation. Reduction of fatty acid readily offers “fatty aldehyde” that can be decarbonylated (or hydrogenated) to α-olefin (or “fatty alocohol”), precursors for surfactants and plasticizers. While ketonization of fatty acid readily yields long chain ketone that can be readily hydro-dehydrated to “fatty olefins”, feedstocks for fuels, fuels additives, lube oils. Designs for the catalytic system using specific and/or multi-functional catalysts are keys for obtaining hydrocarbon products with tolerable deactivation and minimal use of hydrogen.

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