Heterogeneous basic catalysis for upgrading of biofuels

The use of solid catalysts with basic properties is an important research area, both economically and environmentally, with a great potential for the selective production of compounds with industrial interest. Among the reactions that can be carried out with basic catalysts is the deoxygenation of compounds that are in biofuels. These biofuels can be obtained from biomass (wood, vegetable oils, animal fats, etc.) by pyrolysis or by transesterification reactions, are formed by a mixture of different compounds with oxygenated groups. The presence of groups such as aldehydes, acids, esters, etc. is undesirable because it reduces the quality of the biofuel. The removal of oxygen atoms or deoxygenation improves the quality of biofuel, increasing its calorific value, reducing its corrosivity and viscosity and increasing the chemical and thermal stability. Therefore, the biofuel would be more acceptable, economically attractive and could be employed in transport. The deoxygenation can be carried out by decarboxylation or decarbonylation using basic solid catalysts such as FAU zeolites with a low silicon/aluminum molar ratio and ion-exchanged with ions of low electronegativity.

The aim of this work is to investigate the deoxygenation reactions over different catalysts with basic properties such as FAU zeolites with a low silicon/aluminum molar ratio, using two kinds of model compounds: methyl esters and oxygenated aromatic compounds.