NANOCATALYSTS FOR OXYGEN REMOVAL FROM BIOMASS DERIVED BIOFUEL

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Abstract

The use of bio-energy as a renewable alternative to fossil fuels is nowadays attracting more and more attention. Bio-fuel from biomass seems to be a potential energy substitute for fossil fuels since it is a renewable resource that could contribute to sustainable development and global environmental preservation and it appears to have significant economic potential. Liquid fuels can be obtained from fast pyrolysis of lignocellulosic biomass, where fast pyrolysis is a promising route because the process takes place at moderate temperatures, in absence of air and with a short hot vapor residence time. However, these liquid fuels have poor quality due to their low volatility, high viscosity, low heating value, a high oxygen content and poor chemical stability. This high oxygen is due to the presence of oxygen-containing compounds such as alcohols, aldehydes, ketones, furans and phenols. In this sense, catalytic hydrodeoxygenation (HDO) is one the most efficient processes to remove oxygen from these liquid fuels. In this context, the catalyst design is of upmost importance to achieve a high degree of deoxygenation, and bifunctional catalysts are required to achieve high degrees of activity. Noble metal and non-noble metal based catalysts will be evaluated in HDO of model molecules in order to get further insight about the important role of the active phase. Transition metal phosphides have shown excellent catalytic performances due to their good hydrogen transfer properties that diminishes the amount of metal exposed, avoiding, as much as possible, the deactivation, and modifies the electronic density of the catalyst leading to solids that favors the HDO. In addition these phosphides show bifunctional catalytic properties (metallic sites for hydrogenation and acid sites for cracking, methyl transfer reaction, dehydration and isomerization).

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