

Highly selective and efficient hydrogenation of fatty acids to alcohols using NiMo@C catalyst

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Abstract: Selective hydrodeoxygenation is the central challenge in converting bio-derived fatty acids into fatty alcohols under mild conditions. Herein, an effective and highly selective carbon-supported NiMo catalyst (NiMo@C) was developed by the thermolysis Ni-based metal–organic frameworks (MOF) impregnated Mo species. At a low temperature of 160 °C, the stearic acid can be efficiently converted into corresponding stearic alcohols over the NiMo@C with about 97% selectivity at 100% reactant conversion, which is superior to the most reported catalysts containing noble catalysts. The excellent catalytic performance of NiMo@C catalyst was mainly attributed to the ordered arrangement of Ni in the MOF and the uniform loading of molybdenum salt, which leads to an ideal distribution of Ni and Mo after pyrolysis of the MOF. The carbon support also prevents the aggregation of metal particles, which promotes the dissociation of hydrogen and enhances the synergy between Ni and Mo sites. More importantly, the synthesized NiMo@C catalyst showed excellent reusability with no loss of activity after 15 consecutive runs due to the stability of the catalyst structure. This provides a useful and simple method for synthesizing highly efficiency and stable NiMo@C bimetallic catalysts, which can facilitate and selectively hydrogenate the bio-derived fatty acids to corresponding alcohols under mild conditions.