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Highly dispersed Ni and Cu nanoparticles supported SBA-15 for hydrogenation of methyl levulinate to γ-valerolactone

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Highly dispersed Ni and Cu nanoparticles on SBA-15 were successfully prepared by a modified impregnation route and evaluated in hydrogenation of methyl levulinate to γ-valerolactone (GVL). This catalyst was mainly characterized by such techniques as high resolution transmission electron microscopy, X-ray diffraction, N2 adsorption-desorption analysis, H2 temperature-programmed reduction. It was found that Ni and Cu nanoparticles were highly dispersed and anchored into the well-ordered mesoporous channels of SBA-15. As compared with conventional impregnated catalyst, the catalyst exhibits higher conversion of methyl levulinate and better yield of GVL at 200 oC in 3 h with 2-propanol as both solvent and H-donor. The superior catalytic performance can be attributed to the confinement effect deriving from the mesoporous channels of SBA-15, as well as the synergy of highly dispersed Ni and Cu nanoparticles.

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