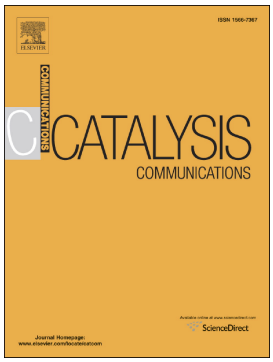

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Lyophilization-based synthesis of HKUST-1 encapsulated molybdenyl acetylacetonate nanocrystals: An effective soybean oil epoxidation catalyst

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Abstract

A novel nanomaterial of $MoO_2(acac)_2$ encapsulated in HKUST-1 ($MoO_2(acac)_2$@HKUST-1) was conveniently prepared by using the lyophilization method. The material, characterized by several techniques including XRD, N_2 physisorption, SEM, FT-IR, XPS UV-Vis DRS and CO-FT-IR, was found to have an enhanced acidity and an additional Lewis acid site different from that in the HKUST-1 crystals. Moreover, the $MoO_2(acac)_2$ complexes were uniformly incorporated into the microporous cages of HKUST-1 and the confinement effects provide by the host porous structure significantly decreased the leaching of $MoO_2(acac)_2$. As a result, this new catalyst showed efficient catalytic performance and was stable, thus, could be recycled in the epoxidation of soybean oil (SBO) with tert-butyl hydroperoxide (TBHP) as the oxidant in toluene solvent.

Keywords: Metal-organic frameworks; HKUST-1; Soybean oil; epoxidation; Lyophilization

1 Introduction

Epoxidation is a commercially important method of functionalizing vegetable

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