

One-pot synthesis of Co_3O_4 nanoparticles using ordered mesoporous carbons as a template and their application for Fischer-Tropsch synthesis

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We used mesoporous carbon materials (CMK-3, MSU-F-C) as templates for synthesis of Co_3O_4 nanoparticles, which have a pore diameter of 3~6 nm and 30 nm and surface area of $1496\text{m}^2\text{g}^{-1}$ and $1041\text{m}^2\text{g}^{-1}$, respectively. The cobalt precursor/ethanol solution was successively impregnated in the slurry of each of the mesoporous carbon supports. Then, following air calcination could led to the nucleation of nanoparticle in the pores and the removal of scaffold, simultaneously. The synthesized nanoparticles using CMK-3 had narrow size distributions around 6~10 nm, and Co precursor impregnated into the pores of the MSU-F-C showed relatively wider size distribution of 10~16 nm. The catalytic behavior of Co_3O_4 nanoparticle from CMK-3 shows more stable and higher catalytic performance than that from MSU-F-C. The catalyst from CMK-3 showed a high CO conversion above 90% and high C5+ selectivity of 78%. The difference of catalytic performance between Co_3O_4 nanoparticles from CMK-3 and MSU-F-C was originated from the nanoparticle size effect on the FT synthesis.