Syngas conversion to useful petrochemicals using heterogeneous catalysts

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The conversion of synthesis gas on the heterogeneous catalysts has been largely investigated for the production of petrochemicals such as methanol, dimethyl ether, hydrocarbons and acetic acid and so on. However, the impregnated active metals on the irreducible metal oxide supports can be easily aggregated under reaction conditions by causing a permanent catalytic deactivation. To overcome the general catalyst deactivation through an aggregation of impregnated active metals on the irreducible metal oxide, we have tried to develop a highly ordered mesoporous structures of metal oxides such as Co3O4 or graphitic carbon nitride (g-C3N4) for some typical CO hydrogenation reactions such as Fischer-Tropsch synthesis (FTS) and carbonylation of methanol to acetic acid through a simple nanocasting method. In the present study, we focused on stabilizing the mesoporous Co3O4 structures to maintain stable catalytic activity under the reductive FTS reaction condition by adding pillaring materials. In addition, the synthesized g-C3N4 was incorporated with active Rh metal to prepare an efficient heterogenized homogeneous catalyst for methanol carbonylation reaction.