Synthesis of Core-Shell $Cu/Al@Al_2O_3$ and $Fe/Al@Al_2O_3$ Catalysts

한도현, 이현주, 이두환†
서울시립대학교
(dolee@uos.ac.kr†)

Layered double hydroxides (LDHs) have attracted considerable attention in recent years because of their various catalytic reaction, such as methanol synthesis, methanol steam reforming, and amination. In our previous study, we attempted to synthesize metal-ceramic core-shell composites containing various elements (Fe^{3+}, Cu^{2+}, Zn^{2+}, Ni^{2+}, Co^{2+}, Mn^{2+}, and Mg^{2+}) using simple hydrothermal surface oxidation (HTSO). Core-shell microstructures containing various elements were synthesized in the form of Al@MeAl-LDH (Me = Zn^{2+}, Ni^{2+}, Co^{2+}, Mn^{2+}, and Mg^{2+}), however, Fe^{3+} and Cu^{2+} did not form a core-shell structure due to precipitation. In this study, in order to overcome this problem, other additives were added to make the LDH shell containing Fe^{3+} and Cu^{2+} on Al core. Therefore, Al@FeAl-LDH and Al@CuAl-LDH core-shell composites were synthesized by controlling pH. Finally, the LDHs are oxidized to form a metal catalyst supported on the aluminium oxide, of which the $Cu/Al@Al_2O_3$ catalyst is used for the water-gas shift reaction and the $Fe/Al@Al_2O_3$ catalyst for the Fischer-Tropsch reaction.