

Studies on the Steam CO₂ Reforming of Methane over Modified Hydrotalcite based Catalysts

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The reforming process is commonly used in the industry for the production of synthesis gas and H₂. Especially steam carbon dioxide reforming(SCR) of methane is good for adjusting proper H₂/CO ratio of 2 to apply GTL process. In SCR reaction, Ni-based catalysts are usually used because of their acceptably high activity and significantly lower cost in comparison with alternative precious metal-based catalyst. However nickel based catalysts are susceptible to deactivation from the deposition of carbon. In this study, Hydrotalcite-like catalysts promoted with Sr²⁺, Ca²⁺ and Ce²⁺ were investigated to control the carbon formation. The catalysts were prepared by co-precipitation method and characterized by various analyzer such as N₂ physisorption, TPR, TPD, XRD, TGA and SEM/EDX techniques. The catalytic performance for SCR was investigated in a fixed-bed reactor with molar ratio of CH₄:CO₂:H₂O=1:1:2, reaction temperature of 700 °C and reaction pressure of 1 bar. It was found that the Ca_{0.5}Ni₁/MgAl catalyst has a moderate basic site and shows higher conversions both CH₄ and CO₂, and resistance to carbon deposition than the other catalysts.