The catalytic activity on Ru promoted $Ni/MgAl_2O_4$ for steam reforming of methane

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The promotional effect of Ru on activity and stability of $Ni/MgAl_2O_4$ catalysts was investigated during steam reforming of methane (SRM). The Ru promoted $Ni/MgAl_2O_4$ catalysts with various amount of 0-1 wt% were prepared by stepwise impregnation and co-impregnation method by using hydrotalcite $MgAl_2O_4$ support. The catalysts were characterized by XRD, TPR, TEM and H_2 pulse chemisorption. The Ru promoted $Ni/MgAl_2O_4$ catalysts exhibited high activity and stability in SRM without pre-reduction treatment compared to that of unprompted catalysts. In addition, the amount of 0.05 wt% Ru was sufficient to obtain equilibrium conversion without pre-reduction treatment. The effect of Ru promotion on $Ni/MgAl_2O_4$ is attributed to the decrease of reduction temperature of NiO species and eventually facilitate in-situ reduction at normal SRM operating conditions.