Studies on Low temperature Dry Reforming of Methane over Ti modified $Ni/ZrO_2-Al_2O_3$ Catalyst

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Dry reforming of methane is a desirable process for the production of syngas from greenhouse gases. However, carbon formation is a serious obstacle against catalytic activity and stability. From previous study, it was found that the $Ni/ZrO_2-Al_2O_3$ catalyst prepared by modified Pechini sol-gel showed best catalytic performance regarding resistant to carbon deposition. To minimize the coke formation, titanium supported on the $ZrO_2-Al_2O_3$ were prepared by modified Pechini sol-gel and the $Ni/ZrTiAlO_x$ catalysts were prepared by an impregnation method. The catalysts before and after the reaction were characterized N_2 physisorption, XRD, TPR, and TPSR analysis. The prepared catalysts were investigated under the reforming of methane with carbon dioxide at temperature of 600 ℃, an atmospheric pressure, a methane/carbon dioxide ratio of 1, and a space velocity of 25,000 h^{-1}. It was observed that the $Ni/ZrTiAlO_x$ catalyst showed improved catalytic stability than $Ni/ZrO_2-Al_2O_3$ catalyst. These result can be interpreted that the Ti supported on $ZrO_2-Al_2O_3$ plays important role in the formation of oxygen vacancy, and improve the catalytic stability at lower temperature.