

The effect of alkali metal in CeOx support on catalytic activity for water-gas shift reaction

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We have investigated Pt/ceria as a WGS catalyst in order to examine the effects of preparation method of support on the catalyst performance. Ceria support was prepared by the precipitation method using various precipitants in comparison with a thermal pyrolysis. The prepared catalysts were characterized using BET-surface area, X-ray powder diffraction (XRD), Temperature programmed reduction (H₂-TPR) and Temperature programmed desorption (CO₂-TPD). Among these catalysts, Pt/CeOx(A) showed a superior activity shown above 90 % CO conversion at 280 °C which was twice as high as that of a commercial ceria supported Pt catalyst under the realistic WGS reaction condition. It is thought that such catalytic enhancement may come from the alkali metal remained in the support during the synthesis procedure. In deed, CeOx(A) support showed a large number of weak basic sites which was induced by the alkali metal as compared to the other supports. From the results of DRIFTS, it could be also concluded that the CO adsorption type on Pt and the formation rate of surface formate species are likely to be affected by the alkali metal, leading to promote the catalytic performance over Pt/CeOx(A) catalyst.