

The effects of preparation method on the performance of Co-CeO₂ catalyst for high temperature water-gas shift reaction of waste-derived synthesis gas

홍가람, 김경진, 이열림, 노현석[†]

연세대학교

(hsroh@yonsei.ac.kr[†])

In our previous research, Co-CeO₂ catalyst was studied for high temperature water-gas shift reaction to produce hydrogen from waste-derived synthesis gas. In this study, the various preparation methods such as sol-gel (SG), co-precipitation (CP), incipient wetness impregnation (IWI) and hydrothermal (HT) were applied to Co-CeO₂ catalyst to derive the optimal synthetic method. Also, the effects of preparation method on the physicochemical characteristics were investigated. As a result, Raman spectroscopy and XPS results showed that the Co-CeO₂ (SG) catalyst featured the highest oxygen storage capacity (OSC) compared to the other catalysts. According to the H₂-TPR results, Co-CeO₂ (SG) catalyst showed the strong metal-support interaction (SMSI) between Co⁰ and the CeO₂ support. In conclusion, Co-CeO₂ catalyst synthesized by the sol-gel method exhibited the highest catalytic activity among the prepared catalysts, even in the severe conditions (high CO concentration: ~38% in dry basis and high GHSV: 143,000 h⁻¹).