Autothermal reforming of iso-octane for hydrogen production over $Ni/CeO_2-Al_2O_3$ catalysts

최상옥, 문상흡*
서울대학교
(shmoon@surf.snu.ac.kr*)

The performance of $Ni/CeO_2-Al_2O_3$ catalysts in gasoline autothermal reforming (ATR) for hydrogen production was investigated. The catalysts were prepared by modifying Al_2O_3 with different amounts of CeO_2, followed by Ni impregnation, and were used for ATR using as a model compound representing gasoline. Reaction tests were conducted using a feed stream of $H_2O/C/O$ = 3/3/0.25 at 600 ℃ for 24 h, which caused the severe deactivation of catalyst by coke formation. In the case of $Ni/CeO_2-Al_2O_3$, 92% conversion was maintained during the test period of 24 h. Hydrogen production was larger for $Ni/CeO_2-Al_2O_3$ than for Ni/Al_2O_3. The results of Temperature-programmed reduction indicated that CeO_2 addition promoted the reduction of NiO and prevented the formation of $NiAl_2O_4$ in the catalysts. The elemental analysis and temperature-programmed oxidation of deactivated catalysts showed that $Ni/CeO_2-Al_2O_3$ produced less amounts and different types of coke on the catalyst surface. Consequently, the CeO_2 modification leads to an increase in H_2 production and coke resistance due to enhancement in NiO reduction and coke gasfication.