Role of H_2 on the selective catalytic reduction of NOx over Ag/Al_2O_3 catalyst by simulated diesel with ethanol

김평순, 김문규, 남인식*, 조병권[1], 오세혁[1]
포항공과대학교 화학공학과/환경공학부; [1]GM R&D
(isnam@postech.ac.kr*)

The selective catalytic reduction of NOx by hydrocarbons is a promising technology for removing NOx from automotive engine specifically under lean condition. However, the low temperature deNOx performance of HC/SCR technology may not be appropriate to practically apply to diesel engine. One way to improve the low temperature deNOx activity over Ag/Al_2O_3 catalyst may be the addition of hydrogen into the feed gas stream. In the present study, the deNOx performance and the characteristics of Ag/Al_2O_3 catalyst by addition of H_2 into feed including simulated diesel with ethanol have been systematically examined. As the hydrogen concentration increases, the deNOx performance is significantly enhanced in the low reaction temperature region less than 300 °C. Based upon O_2-TPD and in-situ FTIR study, one of the primary roles of hydrogen for the enhancement of the low temperature activity is the transformation of Ag to the $Ag-O_x$ complex including $Ag-O_2$, $Ag^+(O_2)^-$ and $Ag-O_3$ on the surface of Ag/Al_2O_3 catalyst. They promote the formation of the reaction intermediates including nitrate and enolic species enhancing the NOx removal activity.