

Influence of different Ni contents in Ni/CeO₂-ZrO₂-Al₂O₃ catalysts on metal-support interaction and hydrogen production from ethanol steam reforming

장개명, Lien Do-Thi¹, 신은우[†]

울산대학교; ¹화학공학부

(ewshin@ulsan.ac.kr[†])

In this study, Ni/CeO₂-ZrO₂-Al₂O₃ catalysts with different Ni contents were prepared by a solvent hydrothermal method for CeZrAlO (CZA) support, and a subsequent impregnation of different amount of Ni into the supports to investigate the metal-support interaction in the catalyst system and catalytic performance in ethanol steam reforming. The Ni content effect on the catalytic performance in ethanol steam-reforming reaction was monitored and explained by the interaction of Ni with the CZA support which was characterized by H₂-TPR, H₂-TPD, XRD, XPS, Raman, and N₂ adsorption-desorption technique. In the results, the addition of Ni into the CZA support created a greater number of oxygen vacancies due to the strong interaction of Ni with the CZA support and the formation of triple metal solid solution. Moreover, the interaction between Ni and metal oxide supports resulted in more facile reduction of surface CeO₂ and also could stabilize the CZ phase. Catalytic reactivity of the catalysts was tested under the various reaction conditions to find out the most suitable condition for ethanol steam reforming reaction.