

Metal-support interaction in Ni/CeO<sub>2</sub>-ZrO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> catalysts and its influence on hydrogen production from ethanol steam reforming

왕명연, Lien Do-Thi, Hongyan Yu, Yong Men<sup>1</sup>, 신은우<sup>†</sup>  
울산대학교; <sup>1</sup>Shanghai University of Engineering Science  
(ewshin@ulsan.ac.kr<sup>†</sup>)

Ethanol has been considerably attracted as an alternative non fossil chemical hydrogen source due to its low toxicity and volatility. In this study, Ni/CeO<sub>2</sub>-ZrO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> (CZA) catalysts with different Ni contents were prepared by a solvent hydrothermal method for CZA support, and a subsequent impregnation of different Ni amounts into the supports to investigate the metal-support interaction in the catalyst system and catalytic performance in ethanol steam reforming. The catalytic performance was monitored and explained by the interaction of Ni with the CZA support which was characterized by H<sub>2</sub>-TPR, O<sub>2</sub>-TPD, XRD, XPS, Raman, and N<sub>2</sub> 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 CeO<sub>2</sub> and also could stabilize the CZ phase. Catalytic reactivity of the catalysts was tested under the various reaction conditions to find the most suitable condition for ethanol steam reforming.