

S-009

Carbon Dioxide Reforming of Methane Over Mesoporous Ni/SiO₂ Catalyst

Dae Han Kim¹, Jong Ki Sim¹, Hyun Ook Seo¹, Myung-Geun Jeong¹,
Young Dok Kim^{1*}, Dong Chan Lim², Sang Hoon Kim³

¹Sungkyunkwan University, ²Korea Institute of Materials Science, ³Korea Institute of Science and Technology

Mesoporous SiO₂-supported Ni catalysts (Ni/SiO₂ and Ni/TiO₂/SiO₂) were fabricated by atomic layer deposition (ALD), and their catalytic activity and stability were investigated in carbon dioxide reforming of methane (CRM) reaction at 800°C. The Ni/SiO₂ catalysts showed high stability as a result of confinement of Ni particles with a mean size of ~10 nm within the pores of SiO₂ support. Besides, X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD) and transmission electron microscopy (TEM) results showed that the Ni nanoparticles were partially buried inside the SiO₂ support. The strong interaction between Ni and the SiO₂ support could also be advantageous for long-term stability of the catalyst. In case of the Ni/TiO₂/SiO₂ catalyst, it was found that the catalytic activity of 10 nm-sized Ni nanoparticles was not much influenced by TiO₂ addition.

Keywords: CO₂ Ni, Porous silica, Reforming catalyst